The Builder.

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TO PARIS at this moment all eyes are directed. The world waits on tip-toe to hear the result of the conferences now going on there. Earnest must be the hope of all who have at heart the welfare of their fellow-creatures, that a substantial peace, honourable and remunerative to the allies, may be achieved. Even the probabilities, however, are at present shrouded in mystery; and all the arrangements which have been made give the notion of an elaborate scheme for stock-jobbing purposes. Who will assess the value of one single hour's exclusive knowledge of the decisions of the curtained and guarded conference chamber?

It would be instructive to trace, hereafter, the real names of the large dealers in Government securities, both in England and France, immediately preceding the announcements of the plenipotentiaries. With this, however, beyond the passing remark, we need not interfere. It is not Paris political that immediately concerns us, but Paris monumental, artistic, and sanitary: and our present object is to add to our series of views illustrative of that capital—a view of the east end and south side of the cathedral of Notre Dame.*

We have already referred briefly to the history of Notre Dame.† The chapels about the choir were finished at the end of the thirteenth century or the beginning of the fourteenth. Between the south side of the cathedral and the Seine stood the episcopal palace, a structure of great antiquity. All that remained of it, together with the modern building which had taken the place of the old work, was sacked and destroyed in 1831, and at the present time the new sacristy of the cathedral (shown in our view) and a public garden occupy the site. M. Guilhermy, in his "Itinéraire," from which we are quoting, gives a graphic account of the destruction of the palace. The building, invaded, he says, by a countless and furious mob, was nothing more than a ruin in a few minutes. At one and the same moment they rooted up the railings and the flights of steps, they undermined the walls, they tore off the roof, they threw out of the windows the marbles, woodwork, and furniture of the apartments. A troop of barbarians formed a chain from the library of the palace down to the parapet of the quay: the books and precious MSS. were passed from hand to hand, each tearing them as he would, and the last man pitched them into the river. And all this was done accompanied by fierce songs and frightful howlings!

The enclosure of the choir and absis of the cathedral was reconstructed at intervals between the years 1257 and 1310. The trefoiled niches in the face of the flying buttresses contained statues which all showed traces of colour, and belonged to the fourteenth century. The flying buttresses themselves (rebuilt when the chapels were constructed) are to our eyes heavy and ugly, and seem to want pinnacles at the top. Their ugliness was less observable when they were in their ancient dark coat.

The new works at the cathedral were begun about 1845, in which year the Government were roused to the necessity of maintaining the ancient monuments of the State, and voted a sum of money for the purpose. The superintendence of the restoration was placed in the hands of M. Lassus and M. Viollet-le-Duc, by whom it has been carried out with unremitting attention. The building had been greatly damaged by the men of the preceding century.

The choir of Notre Dame is one of, if not the, earliest specimen of what we should here call Early English. The first stone was laid in the year of the completion of St. Germain des Prés, 1163, and in 1182 the high altar was consecrated.

The general uniformity of style in a building so vast as Notre Dame of Paris, is very striking to an eye accustomed to the varieties observable in most of our cathedrals. Although its erection occupied a considerable period of time, there is a remarkable correspondence in character throughout. The stone of which the building is constructed is from the quarries in the neighbourhood of Paris, the possession of which has tended so much to the elegance of the city. The enormous wooden roof, of oak, which crowns the building, 356 feet (French) in length, is covered, according to M. Guilhermy, with 1,236 sheets of lead, each 10 feet long and 3 feet wide. At the point where the transept crosses the nave there was anciently a spire, also covered with lead, 104 feet high from the ridge of the roof. It fell into decay in 1792, and was removed soon afterwards.

The magnificent rose window in the south transept, seen in the view, is filled with the original stained glass. This is the case, too, with the window in the north transept and the rose window in the west front. The glass is beautiful in colour, and exhibits a multitude of subjects.

The Hôtel de Cluny, on the other side of the Seine, but not far off, contains some of the vestiges of earlier buildings which were found on the site of Notre Dame. The Palais des Thermes, which adjoins the Hôtel de Cluny, is the most ancient monument in Paris, being at least as old as the beginning of the fourth century. Together, they contain a collection of national antiquities of the deepest interest, comprising about 2,600 objects,—sculpture, carving, pictures, glass, jewellery, ivories, decorations, enamels, porcelain, and metal work.

There is nothing more instructive in Paris than this museum, and it is a heavy reproach to those who have the power, that in England, where the number of such works in private hands is so great as it is, there is no similar collection open to the public.

The Hôtel de Cluny is itself a quaint fifteenth-century building, displaying many curious bits, especially the chapel, with its central column, its range of canopied niches, and the staircase in the angle with pierced stone screen around it.

If there had been a national institution of this kind in England, we should probably have retained here the singularly fine gold *retable*, which was given by the Emperor Henry, in 1019, to the cathedral of Basle, and is now in the Hôtel de Cluny. It was hidden in the vault of the cathedral for safety, when the people of Basle adopted the reformed religion, and was afterwards sold for the benefit of the canton. A year or so ago the owner of it sought to sell it to some public institution, and the French Government obtained possession of it. It is an extraordinary relic, whether considered with regard to its date or its intrinsic beauty. The principal feature is an arcade of five openings, the centre higher than the others, with a figure in each. The whole is in low relief, executed in *repoussé* work, sharpened by the graver. The citizens of Basle, who have been spending much money in the restoration of their cathedral, must regret their loss.

Wandering here in the Palace of the Baths, where the Roman emperor Julian resided, and through the museum of the Hôtel de Cluny, the manners, progress, and the achievements in art of the French people, during at least fifteen centuries, are brought vividly before the eyes and mind of the observer.

* See p. 147.

† See p. 537, vol. xiii. and for a view of the ironwork on one of the doors, p. 635, in same volume. For recent notices and views of other buildings in Paris, see pp. 481, 505, 511, 537, 543, &c. same volume; and pp. 1 and 7, present volume.

PARIS NEWS.

Construction of Granaries.—Amongst the practical results of the Paris Universal Exhibition, the introduction of M. Fluent's granaries is not the meanest. Their object is to preserve the corn sound, even in great masses. They are constructed so as to form a division of compartments (*Silos*), all on one line, and occupying the whole height of a building. The grain is passed through hoppers, each being regulated by an especial trap. Towards the end of the silo, the grain does not descend perpendicularly, but is prevented by a number of diaphragms, placed one above another, at an angle of 45 degrees, and extending all the length of the silo. In consequence of this division in small and vertical compartments, the mass of grain becomes divided, and has to glide down in a diagonal line. The interval and the dimensions are thus distributed so as to allow the passing of the grain upon the whole length of the compartment, which passage takes place at a rate made uniform by the equality of friction. At the issue from the vertical silo, the grain is conducted through a spout, when it is seized by an Archimedian screw, at each winding of which there is a little palette, which turns the grain as would a shovel. It is thus conducted into a small reservoir, whence it is reconducted to the top of the granary, above the upper orifice of the vertical silos. Here it is taken hold of by a sieve, which agitates it again, and makes it descend in a sort of rain on the lower mass.

A Marble Company.—There has been formed at Paris a company for working the extensive marble quarries of the Departement de la Sarthe. The value of marble used in Paris for sepulchral monuments, is six millions; while that of the marble used in the whole of France, reaches thirty millions.

Aluminium.—The Annuaire of the Bureau de Longitude, Paris, states the specific gravity of the new metal, as follows:—At the temperature of water of 4 degrees Réaumur, the specific gravity of melted aluminium is 2·56, that of forged (malleated), 2·67; whereas that of gold is 19·36; and that of platinum, 21·53.

Chatelain, Atlas. — Chronological Atlas of Railroads. Paris, 1856.—In this deserving work the different periods of French railway construction during the last thirty-two years, are made visible in a series of maps. The first chart depicts the embryo state of French railroads from 1823 to 1839; the second, the state of infancy to the year 1841; and thus successively every period of expansion is laid down. Chart eighth shows the different railways, which, from 1823 to 1856, have been constructed by the different Governments. A general historical Atlas of all the railways in the world will become, by and bye, a desideratum.

INQUIRY INTO THE DESTRUCTION OF COVENT-GARDEN THEATRE.

LITTLE progress has been made towards discovering the cause of the destruction of Covent-garden Theatre. On Tuesday last an inquest was opened before Mr. Bedford, the coroner for Westminster, at the instance of the churchwardens of the parish of St. Paul, Covent-garden, who instructed their vestry-clerk, Mr. Mosley Tayler, to take the requisite steps in the matter. The duties of the coroner in old times included inquiry into the origin of fires; and the revival of this portion of the office (originally made by Mr. Payne, the coroner for the City) has very properly been carried forward in the present most important instance. The walls of the theatre—some of them reaching to the height of 70 or 80 feet—the north wall bounding a thoroughfare, and all the walls endangering the adjacent premises—have become even less secure than when we noticed them last week. If we refer to that immediate evidence—as to *one* of the bearings of inquiries like this which

is being conducted at the Piazza Hotel—it is because such evidence happens to be just now very conclusive to any one who will walk to Bow-street. The provisions of the Building Act were promptly put in force by the police, after an order granted at Bow-street the day after the fire; and Messrs. Holland (under the direction of the surveyor to the commissioners) have now erected scaffolding to the principal walls, and are actively engaged in the work of demolition. Part of Hart-street is covered over by scaffold boards, laid on poles resting at one end on the opposite houses; but as the walls extend to a considerable height above, and are exposed to all the risks of March winds, the work is necessarily conducted under considerable danger, both to the labourers and to the public; and it would seem scarcely possible to get through it without accident.

A paragraph also has appeared in some of the journals, referring to the discovery of a fire in some part of Drury-lane Theatre. It will be recollected that the former theatre of Drury-lane was burnt on February 24, 1809, five months after the loss of Covent-garden, and that the shortness of the interval, with no very conclusive reason as to the origin of the fire in either case, led many to favour the idea of incendiarism. The course of the present inquiry may, perhaps, show that there is no reason for the similar explanation which has been offered, as to the origin of the late fire at Covent-garden. The jury must, however, have better means than are at present afforded them, of comprehending the plan and construction of one of a class of buildings, more than usually difficult to be understood by persons not conversant with matters of a technical and professional description. Mr. Smirke, who was present on Tuesday, with plans, seems disposed to render every assistance in his power: Mr. Albano would, doubtless, do the like; and we venture respectfully to urge, that at the next sitting, every means should be taken in what seems *preliminary* to the consideration of the evidence of those who were at the fire. The expense of a few large diagrams,—showing the plan of the building, the arrangement of the roof, together with the boarded ceiling of the auditory, and that of the chandelier and ventilating shaft—would be well laid out. Also, we may say there are models of the "auditory" obtainable; which, with others—showing the usual position of "flies" and scenery—which might be got, it could not but be useful to have on the table.

We agree, therefore, on general grounds, with the coroner, that such inquiries as that which he is conducting should be commonly made. There can be no doubt that were they so invariably, the number of fires would be at length much diminished. In the case of houses,—materials chosen and put together as though *designed* for burning, and against the use of which it seems at present vain to argue—would be less generally adopted.

The inquest, barely opened on Tuesday, now stands adjourned to Saturday in this week. It can hardly be concluded then, if all important points are entered upon. The witnesses already examined have been three of the four firemen attached to the theatre; Mr. Palmer, the gas-fitter; and Mr. Sloman, the carpenter. The evidence is, as might be expected, in some points conflicting; and, without our making any imputation on that score, evidences the desire of each department of the establishment to throw blame off its own particular shoulders. The firemen considered that the fire must have been the work of an incendiary; though it did not appear that they had sufficient ground for saying so, beyond the absence of other discoverable cause: Mr. Palmer's evidence testified to the management of his own concerns, and the general arrangement of the gas fittings; whilst Mr. Sloman contradicted the other witnesses as to the fact of dangerous escape of gas,—saying that he had been continually drawing the attention of the proprietors to it, and even as recently as the morning of the day on which the ball commenced. It is clear that this point should be narrowly gone through. The firemen will admit that there was no escape beyond what would inevitably be noticed in such cases. Gas in the carpenters' shop had not been in use since the time of preparing for the pantomime at Christmas, when the fittings were first put up: but it did not seem to be left conclusive, whether the connection with the painting-room was broken off subsequently, whether the gas could be turned on by others than Mr. Palmer's men, who ordinarily were called upon to take the duty, and whether if at any time turned on, and afterwards turned off at the stage, enough gas might not remain in the pipes to burn a considerable time if lighted. Besides inquiring a little further into such points, the jury might also desire definite particulars as to the currents of air which it was said would render any accumulation of gas impossible. Scientific evidence, also, as to the circumstances under which explosions of gas take place when mixed with air, would be useful, as well as with regard to the results of an explosion could one occur. It may be only by knowing what *could not* have led to the fire, that the desired result of the inquiry may be got to, or the proper precautions taken in other buildings of the like character.

As regards the idea that the origin of the fire was in some manner connected with the length of time during which the chandelier had been burning, the evidence was contradictory as to the hour at which it was lighted, Mr. Palmer saying that the chandelier was lit at a quarter to twelve at mid-day on the Monday, and not afterwards put completely out, whilst James Castle, the fireman, said that he attended the gas-man who lighted the chandelier between seven and eight o'clock on the night (Tuesday) before the fire. We may state that the reports of the inquest in the daily papers do not tally with each other; and certainly do not agree with our own careful notes on several important points; and this—in addition to the fact that actual discrepancies have not been noticed elsewhere, and require to be cleared up—it is which induces us, even before the termination of the inquiry, to go through the evidence, although points may at first appear to be noticed by us not *immediately* bearing upon construction.

James Castle deposed that he had been in the theatre since one p.m. on the Monday, with the exception of a short interval, up to the time when he first noticed the fire, between four and five o'clock on the Wednesday morning. At the time last mentioned, he and his fellow-servants were on the stage. They had remained below because there they could see all the lights in the house, and danger was apprehended from the number of persons who were smoking. None of the firemen had been into the carpenters' shop for some hours; though at three a.m. on the Wednesday, Wm. Butler had gone up to the "flies." There, no smell of smoke was then discoverable.

The duty of the firemen seems to have been left in great measure to their own discretion, except after the conclusion of performances, when they were expected to go through the house once in every hour. It seems doubtful, however, whether they considered this requirement to extend to the carpenters' shop. To this place any one might have obtained access on the night of the fire. The fire was first discovered by Mr. Palmer, who, on being asked by Castle what "battens" he would have kept burning for the workmen who would shortly arrive, looked up from where he was standing on the stage, a little behind the proscenium, and saw a light through the holes in the floor of the shop above.

It should be understood by those not familiar with the plan of theatres, that the carpenters' shop is a room in the roof, floored on the tie-beams, and that it extends over the whole building,—excepting that one small portion at the stage end is parted off, forming the painting-room. The access to the shop is by stairs from the upper "flies,"—the "flies" being galleries used in working the scenery. The floor of the shop is necessarily ceiled under, in the portion of the house in front of the curtain,—boarding being adopted in the case of the Covent-garden theatre,—whilst over the stage, the flooring is exposed, and is cut through in many places for the passage of ropes and other purposes. Over the chandelier there is an aperture, with a shaft above for ventilation, and through the aperture the chandelier is lighted by a rod, with a long wire at the end, on which a piece of wool soaked in spirits of wine can be fixed.

It had been the practice at Covent-garden—when the 800 burners of the chandelier were lighted,—to extinguish the wool, by plunging it into the spirit, which was contained in a vessel that the gasman carried with him; and then the rod was left hanging down, or resting in the basin of the chandelier,—that is to say, below the ceiling of the house. It seems necessary to ascertain exactly what was done in the present instance. Besides the discrepancy in the evidence, as to the hour of lighting, it has been stated in one account subsequent to the fire, that *naphtha* was used, and that some of this spirit was *poured* over the wool to extinguish it, or try whether it had been extinguished,—one of the men holding his hand beneath. The more concentrated forms of naphtha are so inflammable, that disasters have occurred from the mere opening a bottle in the vicinity of a light. It is quite possible, that further inquiry into the facts might show that any suggestion grounded upon points here referred to, could not be received; but where there is so much difficulty, we should prefer that every view of the case should be looked at, if only to be dismissed.

To return to the evidence of the firemen,—it appeared that when Castle had *his* attention called to the light appearing through the cracks of the floor, he rushed up-stairs, followed by other firemen. The door of the shop was found open,—though Castle speaks positively to having closed it when he was up some hours before,—he supposing himself to have been the last person there. The two first men were met by a gush of dense black smoke. By crawling on their hands and knees, Castle and Butler got in some distance, but not near enough to reach the fire-cock: they were then forced to return. All the men agreed that the focus of the fire, as first seen, was situated at a point on the stage side of the proscenium, and a little to the left of the centre. Here, what was burning was a heap of wood, which had been some time lying thereabouts, and the fire was being communicated to other pieces lying around. Mr. Sloman subsequently contended that any waste pieces and shavings were regularly removed, and could hardly have been in the position indicated; though materials and properties were necessarily in the shop,—but chiefly along the sides. A smell, of a character distinct from that of burning wood, was spoken of by the firemen, who considered it as resembling the smell of charcoal. Perhaps not much importance will be attached to the nicety of definition under such circumstances. It, however seems, that the fire, *as first discovered*, was at a considerable distance from the position of the chandelier. Whether peculiar smell could be caused by anything coming under the head of "properties," or by other matters in the shop, or by the marine glue with which the boarded ceiling was originally put together, might be ascertained. The witnesses agreed that there were *no* flues from the shop, though a contrary statement would be inferred from the reports of the evidence. The glue was heated by means of steam-pipes. There were indeed about seventy flues in the external wall, some of which were in use on the night of the fire: some of these occasionally got on fire, but had not done so recently. That may be one slight ground for inferring that they may have done so in the case in question. The cases which we are continually reporting of fires from flues, at least would show the importance of care in a large building where timber enters so much into the construction.

Castle, proceeding with his evidence, states that he got down to the upper "flies." The flakes of fire then were falling thickly from the floor above him. He charged one of the mains, and the water flowed. There were two of these mains on each floor, supplied from a cistern in or upon the roof; and this there seems no reason to doubt was always kept charged with 18 tons of water. By this time, people below were saving their lives. Castle passed to the next "flies," undid some of the straps of the scene barrels, that the scenes might fall clear of the fire; next had to make for the stage,—where he assisted at the main there, as long as pos-

sible—and when he got outside, the engines in the street were at work.

It may be inferred from the evidence that the period which elapsed from the first discovery of the fire, to the time when the flames obtained complete possession of the building, could not have exceeded half an hour. It has been stated that there was much difficulty in getting some of the 200 people safely out. What would have occurred at an earlier hour of the night, even with the comparatively ample provision for egress which there was at this theatre; and what might be the lamentable extent of a disaster any night at other London theatres? But we ought to have said enough on this head, echoed as our warning has been by others. We merely again allude to the arrangements at Drury-lane, perhaps still the best provided theatre; but where the doors of exit first thought necessary have been reduced in number, and where the paying-places seem to be so devised as to produce the very results which occurred from the same cause in the disastrous case at Glasgow. It is to be recollected that no unusual escape of gas or smell of fire was noticed prior to the discovery of the fire. Wm. Butler speaks positively to there being none at the upper "flies" at three o'clock. Could any escape have taken place in the upper part of the theatre, it is considered that it would unquestionably have been prevented from accumulating in the shop, by the draught which there always was through it, and through the ventilating shaft. The escape which Sloman speaks of, seems to refer to what pervaded the house—the carpenter's shop included. It does not appear that he considered it to proceed in the first instance from the shop. Upon the balance between the statements as to the amount of escape, and scientific questions as to currents of air, the nature of gas-combustion, and the causes and results of explosions, the issue may be found to turn. The ceiling of the auditory, it is affirmed both by Castle and Palmer, could not get greatly heated. The lights were not nearer to it than 10 or 11 feet; the flame could not be turned on to a greater height than about 2½ inches; the chandelier had been kept burning during a greater number of hours than on this occasion; and at certain entertainments, twelve smaller chandeliers of eighty fish-tailed burners each, had been suspended round the large chandelier, and still without overheating. The chandelier, as stated by Palmer, could not be raised or lowered. It was fixed to iron bars, and these could not have got overheated.

We have thus gone through the most important particulars, because we believe it will be found that the branch of the question in which we are more particularly interested—the structural one—will be found to have had some connection with the cause of the fire. It should not be assumed, as some have done, that the want of proper watching by the firemen was, as it were, the cause.

Whether it may be possible to adopt methods of construction less liable to communicate fire,—arising from gas, or whatever else,—we have no immediate means of deciding. No one, however, who saw the building at the time at which we wrote last week, could avoid being struck with the remarkable appearance of the walls, arising from a method of building—now fortunately not in use in the metropolis. In all the walls of the original building, bond timber occurred at distances of nine to twelve courses,—sometimes in pieces of large scantling, at both sides of the wall, bolted through to each other. In some places the timber was burning a week after the date of the fire; and may be, yet. Mr. Albano, on the occasion of the important works which he carried out in 1846-7, found at 13 feet from the foundation, a tier of Memel bond timber,—scantling, twelve by six inches,—introduced in the main walls all round. Externally, there was merely the appearance of shrinkage; but on examination, the timber was found to be quite decayed. Not only this, but four other such tiers,—amounting to above 2,000 feet,—as well as the lintels, which had become decayed, were removed. The bond timber was indeed removed wherever the works then undertaken admitted of it: brick and cement being inserted in short lengths, and stone lintels being laid. Having in 1847, given credit to Mr. Albano for his efforts in this particular, and for the general works carried out under him, we are much surprised that we should be held to have *insinuated* anything to his disparagement, at the very moment when we were really lamenting that more had not been possible to be done for the general security of the building from defects of timber construction. Mr. Albano's work, we need hardly repeat, within the main walls, was, as it were, an entirely new building. New fire-proof staircases were erected; extensive alterations and additions were made in entrances, saloons, offices, and apartments; three tiers of boxes were replaced by six tiers; and a great number of minor improvements were carried out. Although, however, the internal space of the auditory, as well as the width of the proscenium were increased, the original quadrangle encasing this space, if we may so speak, and a great number of the external and cross walls (which may be seen from Bow-street) remained; and these are at this moment, in the dangerous state to which we referred last week.—We believe that at the time the theatre was originally built, concrete was not used by Sir Robert Smirke; and it will be interesting to discover whether the timber substitutes are in the condition in which the other timber was found, which might have led to the ruin of the structure by an agency other than fire. In Mr. Albano's new foundations, stone landings were carefully substituted. A wall at the back of the auditory under the galleries, and the curved portions at the angles, remain,—exhibiting plainly their courses of bricks in cement.

The whole of the iron columns of the boxes are amongst the general wreck, and have been acted upon in extraordinary ways by the fire. The girders are generally cracked or broken.

ON THE MANUFACTURE OF CROWN AND SHEET GLASS.

THE admirable manner in which the curiosities of one great division of the glass manufacture, that of flint glass, have been recorded by an able chronicler,* induces me to confine myself to another and scarcely less interesting branch, the manufacture of blown window glass. The history of this glass is most scanty, when compared with the abundant proofs which Egypt, Greece, and Rome, have left behind, of their daily use of vessels and ornaments of glass, and of the skill of those who fashioned them. The general silence of the ancient writers, and the lack of all allusions to the subject, are sufficiently convincing of their ignorance; and even in the first century of the Christian era, the words of Seneca and Philo might bear a doubtful meaning, but for the evidence of an unimpeachable witness. Pompeii, awakened from a slumber of 1,700 years, has proved the existence of window glass in the days of the early emperors. In a small chamber, attached to the bathing-room of a private dwelling-house, excavated about the year 1763, was found "a window, closed by a movable frame of wood, which, though converted into charcoal, still held, when it was found, four panes of glass about 6 inches square." And, in 1824, in a room connected with the public baths, was discovered "a window 2 feet 6 inches high, and 3 feet wide, in the bronze frame of which were found set four very beautiful panes of glass, fastened by small nuts and screws, very ingeniously contrived, with a view to being able to remove the glass at pleasure." But this disclosure goes no further than to prove the then existence of such glass, and does not interfere with our belief that windows of that age were generally glazed with mica stone, or lapis specularis, obtained chiefly from Cyprus, Spain, and Cappadocia. In the fourth century, Lactantius and St. Jerome allude to window glass, and we hear of glass in churches and public buildings; but then, and long after, in these only. Nearly three centuries later, in 674, the Abbot Benedict, so saith the venerable Bede, sent for artists from beyond seas to glaze the church and monastery of Wearmouth, and York Cathedral was glazed about the same time. In the eleventh and twelfth centuries, glass was generally employed in the windows of the numerous religious edifices which the pious enthusiasm of that period called into existence; but the specimens handed down to us fall so far short of the products of to-day, that we can scarcely believe, what is undoubtedly the fact, that the two are results of processes substantially the same.

White glass, for house windows, was not introduced into England until the close of the twelfth century; but, even as late as the sixteenth century, it had not entirely displaced the imperfect method of transmitting light through oiled paper, linen cloths, and wooden lattices. In the minutes of a survey of Alnwick Castle, made in 1573, the following curious entry occurs:—"And because, throwe extream windes, the glasses of the windowes of this and other my lords castels and houses, here in the country, dooth decay and waste, yt were good the whole leightes of everie windowe, at the departure of his lordshippe from lyinge at anie of his sade castels and houses, and dowring the time of his lordshippes absence, or others lyinge in them, were taken downe and lade up in safetie, and at sooch tyme as other his lordshippe or anie other sholde lie at any of the sade places, the same might then be set up of newe with smale charges to his lordshippe; whereas now the decaye thereof shall be verie costlie and chargeable to be repayred."

Glass was, probably, not applied to the windows of English farm-houses before the reign of James I. It is mentioned, in 1615, in a lease in the parish of Suffolk; but as late as 1661, in Scotland, "the windows of the ordinary country houses were not glazed, and only the upper parts of those of even the king's palace had glass, the lower ones having two wooden shutters, to open at pleasure and admit fresh air."

These scanty supplies were chiefly imported from abroad. The manufacture of blown window glass in England existed in the fifteenth century, and, perhaps, even prior to that period; but the glass then produced was of a very inferior description, and the first works of note established in this country were those of Sir Matthew White Ridley and Co. on the river Tyne, at Newcastle, about the middle of the seventeenth century.

Crown and sheet glass are classed among the simple varieties, and are a compound of silica, soda, and lime, the result of the union of silicic acid with two separate bases. Let us regard, for a moment, each of these silicates apart. Silica and soda may be combined by water or by fire, either by the addition of silicic acid to a boiling solution of caustic alkali, or by mixing the two in a dry state and exposing them to the action of heat. In either case the resulting silicate is soluble, more or less so, according to the greater or less proportion of alkali, but still always soluble. The usefulness of this solubility has, of late years, been much developed. In 1844, Mr. Ransome patented the employment of this glass in the manufacture of artificial stone, by mixing it, when dissolved and evaporated to the consistence of a gum, with sand, limestone, and other substances. And quite recently, Mr. Gossage has substituted it for alkali in the manufacture of soap. Its application to the rendering of wood uninflammable is of much older date. But for window panes, it is of course quite useless. Nor is the simple silicate of lime more practicable. It is the result only of the most intense heat, and assumes the form more of a slag than a glass. But the union of these two silicates produces a hard, cheap, and transparent material, not indeed absolutely insoluble, but capable of resisting the action of water for a very long period.

The principle ingredient of this trio is silica—which, already distinguished as the chief element of the bricks with which we build our houses, is now no less distinguished as the chief element of the glass by which we furnish them with light.

The manufacturer employs silica in the shape of sand, selecting such as the microscope and analysis show to be most suitable for his purpose. Every country in which glass is manufactured abounds in this material. The finest English sands are from Alum Bay, in the Isle of Wight, and Lynn, on the coast of Norfolk. The French obtain a very superior sand from the Forest of

* See Mr. Apsley Pellatt's "Curiosities of Glass Making."

Fontainebleau, in the neighbourhood of Paris, and to the purity of this and their other materials the superior colour of their glass may be partially ascribed.

The next important element is soda, which is preferred for this kind of glass, as a cheaper ingredient, to potash. As the use of soda, in its present form, is a comparatively recent introduction, I was anxious to obtain information as to the steps which led to so important an improvement; and I have to thank M. Bontemps for a valuable communication on the subject. Not more than thirty years have elapsed since crown and sheet glass were manufactured from crude alkali obtained from the ashes of a certain sea-weed, and in this country known by the name of kelp. The preparation of kelp for this purpose employed a large population on the northern shores of Scotland and west of Ireland; and the abandonment of this material plunged whole districts into idleness and misery. This kelp was used in combination simply with sand —the kelp containing soda and potash, and furnishing the lime necessary for the composition of the glass. But the glass thus produced was of very variable character, arising from the uncertain quality of the kelp, and also of a very inferior colour, evidence of which is still to be found in the old windows of ancient houses that have escaped the ravages of improvement.

A similar crude alkali was employed in other countries, under the name of barilla, soda of Alicant, &c. and at Venice, and in the South of France, this was mixed with a natural product called the natron of Egypt, and containing carbonate, sulphate, and muriate of soda.

The discovery of Le Blanc, in 1792, which effected the conversion of common salt into carbonate of soda, was the commencement of a new epoch in the history of this glass. The manufacturers of soap at Marseilles ceased to import the soda of Alicant, and employed this new alkali in its place. Their example was followed by the manufacturers of plate glass; and before long, the employment of the old crude alkali was discontinued also in the preparation of blown window glass, and an improved quality and colour was the result.

The alkali thus substituted was the carbonate of soda of commerce, containing, besides carbonate, a considerable portion of undecomposed sulphate. The further improvement which followed, viz. the substitution of simple sulphate of soda for this carbonate of commerce, was due to the researches of the celebrated Gehlen; but some time elapsed before his ideas were carried out in Germany, and it was not until 1825 that the manufacturers of France, released, through the exertions of M. Clement Desormes, from the absurd veto which the government had pronounced on the sale of sulphate of soda, were enabled to turn their attention to the employment of this cheaper article. They proceeded with caution in the introduction of this new ingredient, first mixing a small quantity of sulphate of soda with a large proportion of carbonate, then half of each, and finally, excluding carbonate, they adopted the sole use of sulphate, to the injury doubtless of the colour of their glass, but gainers by the employment of a cheaper and more manageable material. Where colour, however, is an object, as in the manufacture of plate glass, the exclusive use of carbonate of soda is still retained.

The introduction of carbonate of soda, prepared from salt, into the glass manufacture of England, dates from the year 1831. Proceeding cautiously in the steps of their foreign brethren, the English glass-makers, after they had established the use of carbonate, made trial of the effect of a small quantity of sulphate of soda in a large quantity of carbonate. The carbonate gradually decreased, until at length, in the preparation of blown window glass, sulphate stood alone. But here, as abroad, the manufacturers of plate glass still adhere to the carbonate.

As the use, whether of carbonate or sulphate of soda, involves their preparation from common salt and sulphuric acid, attempts have been made to accomplish the direct union of silica and salt, in the manufacture of window glass, but have hitherto failed of success. The black bottles of Newcastle are made from common rock salt and sand from the bed of the river, with the carbonate of lime of the soap-works, and the tank waste of the alkali-makers; but for all better kinds of glass, the circuitous combination of silica and alkali is still found necessary.

The third element in the composition of this glass is lime, which may be introduced as lime, chalk, or limestone. This renders, as I have stated, the alkaline silicate insoluble; and when rightly balanced by the other ingredients, promotes the fusion of the whole, and improves the quality; but when added in excess, the glass becomes hard and difficult to work, and subject to devitrification.

The three sources, then, from which we obtain silica, soda, and lime, the three great elements of window glass, are sand, salt, and chalk or limestone, and of these nature has provided an exhaustless supply.

But besides these, several other ingredients, in much smaller quantities, enter into the composition of this glass. Alumina is sometimes purposely introduced, and is always accidentally present, brought there by the action of the materials upon the clay of the pots in which they are melted. Alumina, if present in any quantity, is always an undesirable element, as, by increasing the number of silicates, it renders the glass more liable to devitrification, it being well known that the more compound a glass is, the more does it display this tendency. Bottle glass, which contains a greater variety of bases than any other, is of all the most easily devitrified.

Another and an unwelcome element is iron, which is almost always present in the sand, sulphate of soda, and chalk, partly in the state of protoxide, the colourizing effect of which is partially destroyed by the introduction of manganese, the peroxide of manganese and the protoxide of iron each possessing colouring properties, but by their mutual action rendering each other comparatively harmless. The effect of manganese is, however, much interfered with by the carbon, which is necessarily introduced to decompose the sulphate of soda. This carbon, subtracting oxygen from the manganese, prevents its action on the iron.

A little arsenic promotes the decomposition of the other ingredients, and tends to dissipate carbonaceous impurities not otherwise disposed of; but, in excess, it produces a milkiness in the glass, which time will increase.

Lastly, to this farrago of sand, soda, chalk, charcoal, arsenic, and manganese, we add what is abundantly produced in every manufactory of glass, a quantity of waste glass, or cullet, which, being more fusible than the raw materials, facilitates the melting.

The ingredients are mixed in much the same proportions either for crown or sheet glass, with the exception of the lime, of which the nature of the crown glass manipulation requires a smaller quantity.

To lay down any standard proportions is almost impossible, as no two manufacturers use the same, and even in the same works the melting powers of the furnaces may so far differ as to render necessary, for the production of the same glass, variations in the proportions of its elements.

The ingredients, having been thoroughly incorporated together, are, without further preparation, introduced into the pots in which they are to be melted. During the period to which I have referred, when barilla, kelp, and other forms of crude alkali were in use, it was the custom to subject the materials to the preliminary operation of "fritting," or stirring them together under the heat of a reverberatory furnace, thereby effecting partial decomposition, and burning off any carbonaceous impurities; but the introduction of alkali prepared from salt has removed the necessity of this treatment.

The pots are made of the best Stourbridge clay, mixed with about one-fifth of ground pot-sherds, and are distinguished from flint-glass pots by their greater size, and by the absence of any hood or cover to protect their contents from the fire. Their size has been of late years considerably increased, both in width and height, and a pot whose dimensions would, a few years since, have excited wonder, is now in ordinary use.

These pots are made entirely by hand, no machinery having as yet been invented that can replace that process, slow but sure, by which, bit by bit, the pot is built up. A good pot-maker, with two assistants, can furnish three or four per week. After a careful drying of many months, they are made ready for the furnace by a previous heating in a kiln or pot-arch. Here a small lump of coal, thrown against its side, tests the soundness of the pot. If, when struck, it rings well, its future is promising; but if it returns a dull sound, it will probably be short-lived in the furnace, though now and then such a pot will disappoint the bad opinions formed of it, and turn out a respectable pot after all.

The terrible task of setting these pots in the furnace falls upon the glass-house crew, and the nicety with which these enormous vessels are adjusted in their place, in the teeth of a consuming fire, is, perhaps, that operation which in the many marvels of glass-making would most astonish a stranger to such scenes.

The average duration of the pots when thus fixed is about seven weeks. Some attain the age of ten or twelve, while others, as every manufacturer well knows, terminate their existence prematurely, either from the naturally defective constitution of the pot, or from bad treatment in the pot-arch, or, more frequently, from its having been "starved," exposed, that is, to a current of cold air, in the furnace, through the neglect of the attendant. "Misfortunes never come singly," is an adage applicable to the catastrophes of pots. It was truly remarked to a manufacturer, at a period when such calamities were frequent, "Your pots break, because they break."

The breakage of a pot often disturbs the furnace to such an extent that the breakage of others frequently follows, and many weeks will sometimes elapse before the disorganization thus produced can be rectified. The loss of the pot and the "metal" contained is nothing as compared with the injury which the glass in the surviving pots, and these pots themselves, are apt to sustain.

My limits compel me to forego any description of the furnace in which the pots are placed, or of the process by which the materials are transformed from their primary condition into a molten vitreous mass. Assuming, then, that our pots are full of melted glass, let us take a brief survey of the two methods by which this glass may be brought into the required form.

Crown glass, as the older of the two in this country, must first claim our attention. Upon the surface of the melted glass is a ring of fire-clay, which, when the materials were thrown in, lay at the bottom of the pot, and after the completion of the melting found its way upwards. This ring is of great service, for, floating in the centre of the pot, it prevents the exterior surface of the metal, or melted glass, which becomes stiff and stringy during the long period of working, from mingling with the interior or hotter surface, which thus remains throughout of a suitable consistency. The labour also of the skimmer, whose duty it is to clear the surface of the metal from any scum or dirt that may collect upon it, is considerably diminished by the ring, which, limiting the space from which the glass is drawn, limits also the space which it is necessary to cleanse, and any bubbles or impurities in the glass have a tendency to attach themselves to the ring.

The metal, or melted glass, having been brought by the gradual cooling of the furnace from a state of complete fluidity to a consistence capable of being worked, the gatherer dips the end of his pipe, or hollow rod of iron, into the pot inside the ring; and twirling it round its axis to equalize the thickness of the gathering, he collects upon the end, or nose, as it is technically called, a pear-shaped lump of glass. Resting his pipe upon a stand or horse, he turns it gently round, and allows the surface of the lump to cool, to fit it for a second gathering. The lump completed, the gatherer having cooled his pipe under a trough of water, that he may handle it at any point, proceeds to roll the glass upon a marver, or metallic bed, until it assumes a conical form, the apex of the cone forming the "bullion point." A boy now blows down the pipe while it is still being turned by the gatherer on the marver, and expands the glass into a small globe. Having been heated, it is blown again, and assumes the shape of a

Florence flask, and the future rim of the developed plate is prepared by rolling the piece, near the pipe nose, upon the edge of a marver. Again heated, it is now expanded by the blower into a large globe. During this expansion, it is important to keep the bullion point exactly in the position which it previously occupied, in a line with the axis of the pipe. To effect this, the blower rests his pipe upon an iron support, and while he blows down the pipe and turns it round at the same time, a boy holds against the bullion point a piece of iron terminating in a small cup. Again presented to the fire, by the peculiar manipulation of the workman and the peculiar direction of the flame upon it, the front of the globe is flattened, the possibility of the globe collapsing during this operation being prevented by its rapid revolution round its axis, The piece now resembles somewhat in shape an enormous decanter, with a very flat bottom and a very short neck. The bullion point is still to be seen in the centre of the flat bottom, and its use now becomes manifest. The pipe is laid horizontally upon an iron rest, and a man approaches having in his hand a large rod of iron called a ponty, tipped with a lump of molten glass. Pressing this lump upon an iron point, so as to give it the form of a little cup, he fits it, when thus shaped, on to the bullion point, to which it soon becomes firmly attached. The lump thus formed is called the bull's-eye, or bullion of the developed plate. The incision of a piece of cold iron in the glass round the nose of the pipe, and a smart blow, soon detaches the pipe, which here takes leave of the piece, and after having lain idle a few minutes, till the glass adhering to it has cracked off, it is warmed, and carried back to the pot to repeat its course.

The end of the piece which was next the now detached pipe is called the nose, and gives its name to the furnace or nosehole where this nose is, on account of its thickness, heated almost to melting, with a view to the coming operation. The glass now undergoes its last and most dreadful torture in the hands of a man who, with a veil before his face, stands in front of a huge circle of flame, into which he thrusts his piece, rapidly meanwhile revolving his ponty. The action of heat and centrifugal force combined is soon visible. The nose of the piece expands, the parts round cannot resist the tendency—the opening grows larger and larger—for a moment, is caught a glimpse of a circle with a double rim; the next moment, before the eyes of the astonished spectator, is whirling a thin transparent circular plate of glass, which, but a few minutes before, was lying in the glass-pot, an undistinguishable portion of the molten mass. Still whirling, the table, as it is now called, is carried off, laid flat upon a support called a whimsey, detached by shears from the ponty, lifted into the annealing kiln upon a fork, and piled upon its edge against the preceding table. The weight of so many tables pressing one against another would cause the hindermost to bend, but this is prevented by the intervention of iron frames or drossers, which divide the tables into sets, the first drosser leaning against the wall of the kiln, the second against the first and so on, and thus rendering each set of tables independent of those behind it for support. As the bull's-eye or centre lump, which the ponty has left behind it, keeps each table from close contact with its neighbours, the air passes freely between them, and the annealing is accomplished with tolerable rapidity, varying from twenty-four to forty-eight hours, according to the number of tables in the kiln. From the kiln the tables are conveyed to the warehouse, having passed, since their first exit from the pot, through the hands of ten distinct workmen.

The above brief and vague description of a marvellous process will, I trust, be intelligible to those who have themselves seen it: to those who have not seen it, no description, however elaborate, no diagrams, however clear, can convey any idea of the perpetual change of form, size, and appearance which the glass exhibits during its growth.*

* The foregoing is a portion of a paper by Mr. Henry Chance, M.A. read at the Society of Arts, on the 13th ult. We shall give the remainder hereafter.

GEOMETRICAL PROPERTIES OF CONIC SECTIONS.

THE ELLIPSE.*

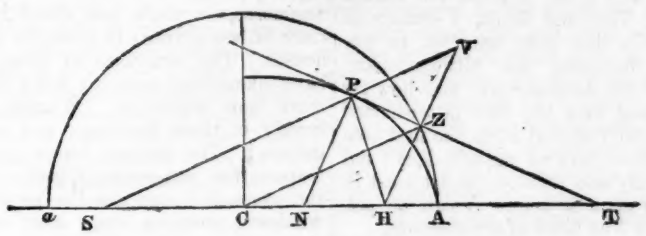


Fig. 4.

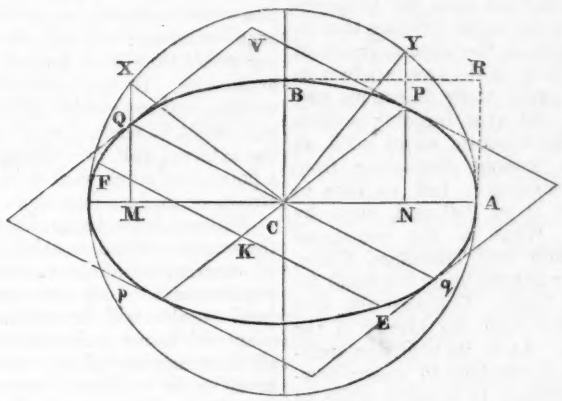


Fig. 5.

THE following is another method of drawing a tangent, and is introduced in order to explain some important properties of the ellipse:—

Let S and H (fig. 4) be the two *foci* of the ellipse, and P any point on the curve. Draw S P and H P, produce S P to V, and make P V = P H. Join V and H, and bisect the line V H in Z; then P Z is the tangent at point P, since it bisects the angle V P H, and one property of the ellipse is, that *the tangent bisects the external angle of the focal distances.* S P and H P are called the *focal distances*, and H P V is the external angle which they make with each other.

Since C S = C H, and H Z = V Z, it follows that, if we join C and Z, the line C Z will be parallel to S V, and will also be equal to half the length of S V, by the sixth book of Euclid. But S V = S P + H P = A*a* = twice C A; therefore C Z = C A, or C Z is a radius of the circumscribed circle; and thence it follows that *the perpendicular* H Z *from the focus* H *upon the tangent meets the tangent in the circumscribed circle.*

Since the tangent P T bisects the angle H P V, it follows that the *Normal* P N (or perpendicular upon the tangent at the point of contact) bisects the angle S P H; therefore the *focal distances make equal angles with the Normal*, at any point of the curve to which they are drawn. Hence it will be evident, that if we have a reflector in the form of an ellipse, and a light is placed at S, all the rays which fall upon the curve will be reflected to H, and *vice versâ.* This is why S and H are called the *foci* of the ellipse.

We here presume the reader to be acquainted with the fundamental law of light, that the angle of reflexion equals the angle of incidence.

Hence it will be seen that the elliptic form is a bad one for the contour of a building intended for public speaking; since if a powerful speaker happened to be placed at or near to one focus, the part of the audience near the other focus would be deafened by the noise of the reflected voice.

In the circle, any straight line which passes across it from one point on the curve to another, but does not pass through the centre, is called a *chord;* and if the line passes through the centre, it is called a *diameter* of the circle. The same terms are applied to lines similarly drawn in the ellipse, but with this difference, that whereas the *diameters* of any one circle are all of equal length, those of an ellipse vary in length. The lines P *p* and Q *q* (fig. 5) are diameters of the ellipse.

The term *conjugate diameters* is applied to those which have the following relation to each other:—

Let P *p* be any diameter and P V the tangent at the point P. Draw the diameter Q *q* parallel to the tangent at P, then Q *q* is called the *conjugate diameter* to P *p*, and it has this peculiarity, that the tangent drawn at Q is parallel to the diameter P *p*, and therefore P *p* is the *conjugate diameter* to Q *q*. And since any diameter divides the ellipse into two equal and similar parts, it follows that the tangent at *q* will also be parallel to P *p*, and the tangent at *p* parallel to Q *q*. These diameters, therefore, possess this property, that *the tangents at the extremities of any diameter are parallel to the conjugate diameter.*

If we draw a *chord* F E parallel to Q *q*, we shall find that F E is bisected in K by the diameter P *p*; and if we draw a *chord* parallel to P *p*, it will be bisected by the conjugate diameter Q *q*; one of the properties of *conjugate diameters* being, *that each diameter bisects all the chords parallel to the other.* It will be evident that the major and minor axes are conjugate diameters.

If the tangents at P and Q are produced to meet at V, we have a parallelogram (C V) drawn upon the half conjugate diameters, and it has this remarkable property, that it is equal in area to the rectangle C R drawn upon the semi-axes. Therefore, if we draw the tangents at each extremity of the diameters, it follows that the parallelogram formed by them outside the ellipse is equal to the rectangle upon the major and minor axes. We have, then, this connection between all conjugate diameters of the same ellipse, that *the parallelograms formed by the tangents at the extremities of conjugate diameters are all equal to each other in area.*

There are other peculiarities connected with the conjugate diameters, of which we give the two following:—

If we draw the ordinates N P and M Q, and produce them to meet the circumscribed circle in Y and X, then the ordinate N Y will be equal to C M, and ordinate M X equal to C N.

Lastly, draw the radii C X and C Y: the angle X C Y will always be a right angle.

E. W. TARN.

* See p. 106, *ante.*

THE IRON TRADE.—No change worth notice has taken place of late in this trade, except that there is talk of a probable reduction of price at quarter-day. At all events, there seems to be not the slightest idea of any rise in price being attempted on that occasion. Already, as we before noted, iron is sold considerably below the nominal prices of last quarter-day. Orders meanwhile are withheld in consequence of the rumours of an acknowledged reduction.

STYLE FOR MODERN BUILDINGS.

HAVING read with great interest the letters of Messrs. Petit, Tite, and Scott, I venture to add some remarks that have occurred to me. The subjects discussed are Utilitarianism. Classical and Gothic Architecture, and how far utility is combined with the two latter-named styles. That utility should form the first consideration in architecture no one will deny; but this must be only one point,—the art must be brought to bear upon it before it can be presented to us as a true piece of architecture.

In my walks through London I am continually on the watch to see how far the styles adopted in modern erections fulfil the purposes intended, and I know no recent building that so amply satisfies the utile as the present Palace of Westminster. Striking as the new façade is in Palace-yard, I am aware many objections may be urged against it; but what building is there in London where the windows afford such an abundance of light without detracting from the effect of the building? Let us turn to palaces coeval with it in Pall-mall, some by the same hand. What is the prominent defect in the Reform and Travellers' Clubs, but the size of the windows being too small for our dark climate? Again. Compare the new library at the Carlton with the library of the House of Commons. As to its utility or architectural effect, even descending to minor comforts in modern buildings, it is worth while to visit the smoking-rooms in the two buildings under comparison. Again, let us test these various buildings by originality. Have we never seen the Travellers' Club, the Reform, or Carlton, elsewhere? I recollect being summoned to a meeting at the Carlton, to consider the subject of the rebuilding of the club. On the chimney-piece was placed a print of Sansovino's library, to disarm criticism. The frieze of the Athenæum was designed before the birth of our Saviour: it can hardly be claimed as original or appropriate. But where do we find the new building at Westminster, or a similar façade to that which faces us as we enter Dean's-yard? There is a new club now building in Charles-street. Curiously enough, I opened Gwilt's "Encyclopædia of Architecture," and found the identical cornice at fig. 947. In this building, utility seems to have encumbered it; the bows in either front are disfigurements; and so the architect evidently feels them, more especially in Charles-street: the door also, following convenience, is not in the centre. How much do I feel might have been made of these irregularities in the Gothic style, while the necessary unity that must be observed in the Italian is destroyed! Utility has not altogether been met with at the Exchange: the shops, to serve that purpose, have cut away the granite bases of the columns, and I have been told that the western portico is a recollection of the Temple of Jupiter Stator. I also see the perforated iron gates are glazed.

Let us now turn to church architecture. A chancel is not necessary to a Gothic building, but is to a church, regardless, of style a matter of ecclesiastical propriety. The same may be said of a stone pulpit: it is neither classical nor mediæval; and, if utility is to govern the practice, I prefer a wooden one with the fewest points in contact with the floor, assisting the preacher's voice, as a sounding-board in a piano forte.

I will now turn to engineers' architecture, which is not encumbered with style, but where material may be supposed to be worked up in the most scientific and economical manner. Let us go no further than Camden-town Station. On the left-hand I observe a buttressed building, almost an Early Gothic church; and on the right a large Chapter-house; while, close to the carriage-door, I see a window designed by an architect much in favour of the classical, which I long to chamfer, to make it more useful and mediæval.

While on the subject of the useful, let me draw your attention to a modern application of science to our comforts, viz. gas-lighting. Walk through the Palace of Westminster, and compare the *gasiliers* there in the Gothic style with those in the Italian, in the Carlton Club: look at them with the eye of an artist or an utilitarian.

As to a class of buildings which are now becoming very prominent features in our great town of commerce,—a whole new street in the city is more or less devoted to examples of large warehouses. The architects of these vast houses have taken some pains to make these erections more than utilitarian. Wherein consists the beauty of these buildings, and where are the defects? The cornice forms the prominent feature (the non-essential part): the defect is the glare, if I may use the expression, of the windows, mounting story after story in equal sizes. These defects I attribute as much to the style adopted as the architect; but how easily had the Gothic style—a style so pliant in fenestration—been adopted, could the difficulties have been overcome: the real essential of the building would then have formed real architectural ornaments. It also occurred to me that the winding-staircase which all these buildings contain might be made a very valuable feature to the external wall, or a variety in the line of roof, a point very much wanted in the long, straight streets of modern formation.

Without dogmatising, let the two styles be thoroughly studied, as exhibiting the best means of erecting buildings suitable to our present requirements. I am sure that happier architectural results will be produced by seeking to adapt old forms under new combinations than all the struggling after a new style, which can never be the creation of one mind, but a succession of great minds struggling to mould right principled forms to existing circumstances. I think this the history of architecture teaches us. Though I appear as an advocate of the architecture of the Middle Ages, I strongly recommend all young architects to thoroughly study the Parthenon, should they intend to exclusively practice in the Mediæval style.

AN AMATEUR.

THE SELECTED DESIGNS FOR BARRACKS.

THE area proposed to be occupied by the design for a Cavalry Barrack, marked "Paritur Pax Bello," and submitted by Messrs. T. H. and M. D. Wyatt, is about twenty-two acres. It presents the following leading features:—

The whole barrack-yard is enclosed with a boundary-wall, 12 feet high, having only one principal entrance to the south. It has been thought very important, that for the purposes of inspection, ventilation, and security, no buildings of any kind should be allowed to abut upon the boundary-wall.

The quarters for married officers have been so arranged as to admit of as much privacy and separation from the ordinary working of a barrack as practicable.

The quarters for the unmarried officers have been placed in the two wings looking towards the barrack-parade, and approached only from that quarter.

A racket-court is provided for the use of the officers, immediately adjoining their quarters, with a bath-room and dressing-room.

The "sergeants' quarters" comprise a mess establishment, quarters for the band-master, and a band practice-room; with apartments for schoolmaster and schoolmistress, immediately adjoining the "chapel school."

Distinct accommodation is provided for the staff sergeants, in a central and important part of the barracks.

A powder-magazine and shifting-room are placed immediately in the rear of the sergeants' quarters, and surrounded by a wall, so as to form a magazine-yard.

No real objection is thought to exist to the practice of having the soldiers' dormitories over their stables; a fire-proof floor being constructed between them, impervious to smell, and materially deadening sound. The ventilation of the stables is so contrived as to prevent the vitiated air from passing to the dormitories through the windows. The men of each troop are accommodated in a distant wing over the immediate horses of that troop, and are divided into four dormitories of thirteen each,—a number which it is believed would be more agreeable to the men than if there were only two dormitories and twenty-six men in each: if, however, it shall be considered preferable to have the larger number, nothing will be easier than to have the rooms thus arranged. The ground space allotted to each man is not less than 7 feet by 5 feet. The rooms are all warmed by fireplaces, and average 13 feet 6 inches in height. The four rooms of each troop are approached by a separate stone staircase, and by a gallery or covered passage over the shed at back of stables. These galleries may be entirely enclosed, or only partially so, opposite the door leading into the dormitories, so as to prevent a draught of cold air into the rooms.

Distinct accommodation is provided in a separate part of the barrack for twenty married men; each couple having one room, 14 feet by 12 feet.

A washing establishment, a "drying-room," a ball-court and gymnasium, quoit and skittle grounds, are provided.

The kitchens are so arranged as to serve for dining-rooms, having abundant height and ventilation. The space appropriated to the actual cooking of the provisions is separated by a screen from the place where the men take their meals. One kitchen and dining-room combined is appropriated to each troop, and the tables are so arranged as to permit the men sleeping in each room to have a separate table permanently allotted to them. The kitchens are in buildings detached from those in which the men's sleeping-rooms are situated, but communicating with them all by covered passages.

The library and reading-room are placed in the most central part of the barrack.

The troop horses are arranged on three sides of a square (two troops on each side), and each troop divided into two stables by a broad archway, for facility of ingress and egress. The two stables for each troop contain fifty-four stalls, forty-five for troop horses, and nine for spare standings and utensils, being the proportion required by the report, and making in all 324 standings. Although this accommodation is practically divided into twelve separate stables, giving an average of twenty-seven horses to each, yet for all purposes of access and inspection, it may be said to be one stable. The stalls are 9 feet long by 5 feet 8 inches wide, the passage between the horses' heels being 12 feet.

The stables for the officers' horses are placed in a separate building, of easy access from the quarters of the officers, and sufficiently near the "horse infirmary." Accommodation is provided for fifty horses; with the same proportion of spare stalls and standings for utensils that is suggested in the report for the troop stables.

The establishment for sick horses is placed in the centre of the ground, at the back of the troop stables, and is so arranged that every troop horse can be taken into it under cover. It comprises six stables, with large stalls for sixteen horses, and twenty loose boxes. A surgery and boiler room are provided. It is proposed to cover in with glass a space of 140 feet by 35 feet, for the purpose of exercising the convalescent horses.

Water would be laid on at the door of every stable, in addition to the twelve stone troughs in the barrack-yard, against the walls of the stables.

A riding school, 60 yards by 20 yards, is placed in a position, central to the troop stables, and so arranged that every troop horse may be taken into it under cover. The school will be found abundantly lighted and ventilated, and will be an imposing feature in the establishment. Every soldier in the regiment can also approach it under cover.

Those portions of barrack accommodotion devoted to the administration and discipline of the regiment have been placed in immediate contiguity to each other, adjoining the entrance to the barracks, near the officers' quarters, and those appointed to the staff serjeants. An orderly room, a clerk's office, and a court-martial room, are in immediate communication with each other.

The guard-house (adjoining the entrance archway) consists of a guard-room, two small lock-up rooms, one of which communicates with the court-martial room, and two cells for drunk or violent prisoners.

Those parts of a barrack relating to the supply of the regiment are placed adjoining the entrance to the barrack, and in the opposite wing to those just described. The quartermaster's stores and office are entirely distinct from the barrack-master's.

The barrack-serjeant has quarters immediately attached to his stores.

The barrack-master's house would be situated immediately outside the barrack wall, at the S. E. angle, and nearest to his office and stores.

The hospital is placed in the S.E. angle of the barrack-yard, in a cheerful and sunny situation, and away from the noise of the men's quarters. It has been thought better that the invalids should be taken to the hospital, than that the building should be placed in the neighbourhood of the more crowded part of the barrack.

The canteen is situated between the serjeants' quarters and the men's rooms, and it has been thought more likely to tend to cleanliness and order if this building was placed in a somewhat prominent situation rather than at the back of the barrack, and in some out-of-the-way place, as is found in many existing barracks. A covered way connects the men's tap-

room with the ball-court, skittle-ground, and gymnasium, and to all of which there are also entrances distinct from the canteen.

It is not proposed in this design to introduce any other system of warming than by open fire-places.

Of the infantry barrack (Mr. Morgan's design) we will give some particulars next week.

OXFORD ARCHITECTURAL SOCIETY.

AT the fifth ordinary meeting of the Society, held on the 27th inst. the Rev. H. B. Walton read a paper on Merton College Chapel, preparatory to a visit of the members of the society to inspect the architectural features of Merton Chapel, as well as the other antiquities of that college. For the sake of illustrating the *historical* interest attaching to architectural studies, the first part of the paper furnished a sketch of the life of Walter de Merton. The effect of his untimely death upon the building of his chapel was next shown, and an architectural history and description of the present structure given. The several dates furnished, according to the report in the *Oxford Herald*, were, the choir 1277, the sacristy 1310 (from the bursars' rolls giving the wages of the workmen employed in that year for digging its foundations), the tower arches 1330, completion of the transepts 1424, when the church was re-dedicated. The architectural features of the chapel were severally alluded to, together with notices of the stained glass, the brasses, &c.

At the following and last meeting for the present term, held on Wednesday, March 5th, Mr. Hingeston, of Exeter College, gave a lecture "On the Perpendicular Style," of which the following is an abstract :—

"Towards the end of the fourteenth century a great change came over the architecture of this country. It began to decline. And this change first manifested itself, as, indeed was likely, in the feature which, more than any other, was characteristic of all styles—*the window*. The graceful, flowing lines of Decorated tracery began gradually to lose their elegance and freedom, and to become more and more rigid and stiff. And this stiffness was not confined to windows, but soon spread over every detail, waving lines being exchanged, whenever possible, for perpendicular ones; hence the very appropriate name assigned to the style by Rickman—'*Perpendicular*.' The date at which this style came into general use was the year 1377, or perhaps a little earlier; but as we have seen was the case with the previous styles, the sign of transition—in this case the Perpendicular line—had appeared some years before. The earliest instance known of a Transitional church is the very remarkable church of Edington, in Wilts, which was consecrated in 1361. It was built by William de Edington, Bishop of Winchester, and some have supposed that his successor in that see, the famous William of Wykeham, taking the idea from Edington's innovations, invented the Perpendicular style. Whether this theory be true or not, of this much at least we are certain, that Wykeham was the greatest architect of his day, and that his own foundation of New College is the earliest pure building of the style. It was begun in 1380, and finished in 1386. But to return to the church of Edington. It is transitional throughout,—not merely showing signs of a change here and there, but begun and finished within the period of transition,—in general design and effect, Decorated,—in detail a remarkable mixture of the two styles between which it stands midway. For instance, the west window, which is large, and of eight lights, appears at a distance to contain Decorated tracery, and the Perpendicular lines are scarcely noticed, though they occur at every opening. This is probably accounted for partly by the fact that not one of the mullions is carried up into the head of the window, and thus, the Perpendicular lines being broken and scattered, the idea of perpendicularity is only imperfectly expressed. The doorway beneath exhibits a still more singular mixture of styles. The arch is segmental, as in ordinary Decorated work, but the upper part, forming a kind of tympanum over two doors, is filled with Perpendicular panelling, and the whole is surmounted by a square hood-moulding, which is of very unusual occurrence in Decorated work, though a similar example occurs in the north aisle of Dorchester Abbey Church. William de Edington began, and Wykeham continued, the alteration of Winchester Cathedral; and although the new works are, of course, in the Perpendicular style, at least those of the former prelate are not wholly free from traces of the preceding style. In 1380, however, we find the new style thoroughly established, and the flowing line of the Decorated period utterly abandoned."

The lecturer then described windows, doorways, buttresses, towers, roofs, and other portions of buildings, and concluded as follows:—"During the sixteenth century, Gothic architecture gradually declined till it became almost extinct—and a semi-Grecian style took its place, in which, nevertheless, Gothic features were occasionally employed, as in the windows in the tower of All Saints' Church, in this city. Sir Christopher Wren's London churches are mostly of this description. The introduction of this debased style took place on the Continent earlier than in England; and, if it be true that the dissolution of the monasteries in this country checked church-building and church-restoration, there can be little doubt that fewer remains of the Middle Ages would have been handed down to us, had they remained. Church-restoration and church-building would have been prosecuted with all the old activity, but in the spirit which originated St. Peter's, at Rome, and replaced old St. Paul's with the present Italian structure. Now that architectural knowledge has attained a high standard among us,—while we rejoice at every new instance of correct and yet conservative restoration, some of us are occasionally heard to express regret that much was done before sufficient knowledge was attained. Had the present zeal for church-restoration sprung up 300 years ago, without doubt many of our great cathedrals would have been irreparably disfigured, and mediæval Oxford itself 'Italianized' throughout! It was remarked at a previous meeting that while the pseudo-classical styles were brought into general use first on the Continent, and afterwards in England, Gothic architecture lingered at Oxford. Wadham College was mentioned as a remarkable example, the chapel of which is well known for its apparently fifteenth century architecture,—and yet it was built in the reign of King James. The hall of Exeter College is of the same date, and equally good: the greater part of Jesus College and the Fellows' Quadrangle at Merton, were also built at a period when Gothic architecture was elsewhere a lost art. I believe the schools are of the same date, and Gothic of a kind, but not, I think, likely to be ever very much admired. I must not forget to mention the famous staircase to the hall at Christ Church, which was built in 1640, and though meagre in some of its details, all must admit that the design and effect are worthy of the fifteenth century."

IRELAND—ITS PROGRESS IN ARCHITECTURE.

To revisit this country after a lapse of twenty-five years is to see all things changed; for the arts of commerce and of agriculture revive under the auspicious influence of benignant government, and of happy vicissitudes. Whithersoever we turn in the counties, quietude reigns; an *improved system of farming* is widely spread, and domiciles of an amended, although perhaps of a more moderate and medium character, have replaced the halls of the old and departed squirearchy. As for the nobility, they rarely dwelt on their fues,—those who erst abode, still remain; but the proportion is too infinitesimal, and too uninfluential, to arrest the onward progress of a movement that is destined to change the tone and character of a whole nation.

Within the period specified a generation has nearly passed away, and with it, old prejudices and habitudes have also disappeared; religious tolerance takes the place of savage animosities; and the onward march of improvement nerves the hand of industry; making desolation productive, and "the wilderness to blossom as a rose."

In the metropolis the improvement is truly astounding: a population of 180,000 inhabitants has been nearly doubled, and the extension of the city increased beyond even the proportionate advance of London. Dublin, always distinguished for her splendid public buildings, unequalled by any other capital for the beauty of her vicinage, has been still further embellished; the churches (St. Patrick's and Christ Church) have been insulated and thrown open; the magnificent Custom-house, the noble courts of law, lately completed, and the Classic Bank need no commentary; the suburbs have been extended in miles of villas; two commodious, and even magnificent, harbours (Queenstown and Howth) have been constructed at convenient distances; the Phœnix-park and its approaches have been improved; the College-park thrown open, its wall replaced by a railing (like Kensington-gardens); and the narrows of streets (such as Holborn-bars and other straits of London) have been expanded to free commerce and daylight.

There exists now, and there must have been always hitherto, a public spirit in this comparatively poor place, far superior to that which condemns London to a filthy river without quays; and to an unembellished city, with all the wealth which boundless commerce can confer. The public buildings of old standing here are far superior (bating only the glorious St. Paul's and the venerable Abbey) to those of Great Britain's capital. There are seven bridges, and only one with a toll! There are two cathedrals with peerless choirs; there are railway stations of more than common pretensions, at fair proximity to the centre; and there have been erected churches of all persuasions, in style and character fully equal to the increase of population, as proportioned with other cities of the empire; but the most palpable improvement effected in Dublin within the period specified is the enlargement of the National University, and the erection of a noble quadrangle, in keeping with the fine façade presented to College-green.

Trinity College, the *alma mater* of Ireland, is now increased in extent, so as to be fully adequate to enrol 3,000 pupils; and the class of education, as now practised therein is such, that the graduates of the University are inferior to those of none other in the world; the curriculum has been enlarged, restrictions in a great measure removed, and the more useful arts are now inculcated,—those arts which fit men for the practice of science in the utilitarian walks. A school of geology has been of late established under the auspices of an able professor, the Rev. Samuel Houghton, and to him is committed the whole charge of that department, in which his acquirements are the more illustrious, for his youth.

To form lecture-rooms for swelling numbers of students, a magnificent structure has been just erected, and is now in progress of completion, in the park, at the rear of the college. This park, central in the town, contains, perhaps, about thirty English acres; it is planted, and is at the same time ornamental to the town, and useful to the college; not, perhaps, so much for the reserve of air which it retains, as for its object as a play-ground. An elevation of the longitudinal front was given in the *Builder*, some time back, as designed by Messrs. Deane, the architects.

This building occupies an area of 160 feet by 85 feet: it consists of a *pian' terreno*, and grand story; and is for effect of style, and for the beauty of finish, as well as for the polished marble columns, and enrichments of the interior, unequalled.

In a paper like the *Builder*, whose province it is to discover talent, and to exhibit it to the credit of the happy possessor, it may not be inadmissible to name the artists to whose skill and assiduity the peculiar excellence of sculptured workmanship is due, and without the knowledge of the individuals, whose names were asked and modestly given, while unconscious of the object of inquiry; the writer takes leave to mention that to one Englishman, Mr. Roe, of Lambeth, assisted by the native talent of three brothers, workmen, the O'Sheas, of Ballyhooly, county Cork, the whole of those most elaborate, and as yet unique, sculptures are owing.

The ornature is for the most part wreathed in foliage—the oak, the ivy, acanthus, shamrock; lilies, lotuses, birds, and, in fact, every variety of wreath—and these so diverse, so diffuse, so graceful, that the very diversity establishes its beauty.

Since this has been done (and it is the work of the last two years), one shop in Dublin has adopted the wreathed arch in the door and windows, and the style bids fair to become popular here—as it must obtain in England, as soon as it becomes known.

In this fine hall, now in course of being roofed in, Irish marble of varied colours, and polished, are used with great effect; although the disposition of the columns (as to colour) does not give complete satisfaction to the writer; nevertheless the lavish enrichments of sculpture within—capping every column, enwreathing every arch—and the commixture of rich colour in the crowning arches, which are groined in encaustic brick,

will present, when complete, an ensemble so gorgeous, as no other example of architecture in this country can approach.

At present the structure is finished to the top course, and the blocking is laid on, to receive the tasteful garniture from the chisels of our Ballyhooly sculptors. It is as yet blank, and it occurs to the writer, who saw a wooden block with the design for the upper cornice *painted thereon*, to suggest a change: that change would be, to substitute for, and instead of, the series of projecting angles, or diamonds (as sketched out), *a bold wreath of oak-leaf*, with (if they like it) an acanthus over every blocking or cantilevre. This hint is given with great respect to the architects, and in all the humility of one who has sometimes uttered a crotchet on works in progress. The effect of the lower cornice with the acanthus, in moderate relief, is excellent; and the design would be more consistent with the whole series, by completing the crowning cornice in a foliated pattern.

As for the medallions between the windows in *pietra commessa*—being insertions of the various Irish marbles, polished, and set in Moorish patterns, these being placed on a plain granite paries, are wholly dependent on colour for effect; and it might be well to consider whether blocks of Portland, sculptured with heads (say of philosophers, or even of the senior Board) might not be more apposite. There is no variation in colour in any other part of the exterior: and here, too, wreathed or foliated borders would comport better with the rest.

Of Mr. J. McCurdy's share in the internal arrangement and adaptation of this fine structure, mention has been already made in these pages, though not by QUONDAM.

FORMS AND MUSICAL PROPERTIES OF BELLS.

DURING the discussion on the subject of bells at the Institute of British Architects, I have been adding to my stock of information by reading the remarks of those authors, both foreign and English, who have made this subject their especial study. At the discussion on the 11th inst. I fully expected that some one would have spoken more decidedly upon the musical properties of bells, because, as I shall presently show, their nature, to a considerable extent, has been known for centuries. Those who have the slighest ear for music will have observed, that when a bell is struck, a musical *chord* is produced, and not merely a single tone; or in other words, the fundamental tone, its octave, and either its major or minor third, will be distinctly heard. My attention was drawn to this phenomenon by reading Kreuser's "Christliche Kirchenbau," Bonn, 1851; and Heinrich Otte's "Kunst Archäologie" of Germany. Leipzic, 1854. Kreuser remarks that the art of casting bells, and the knowledge of their musical phenomena, were not in an advanced state until the prevalence of pointed architecture in Germany. He quotes the following passage from an old author named Vincent of Beauvais:—"Campana in tribus locis, si pulsetur, tres habere sonos invenitur, in fundo mediocrem, in extremitate subtiliorum, in medio graviorum." Otte remarks, under the article "Glocken," that there is at present very little known about the musical properties of the mediæval bells, although a more extensive knowledge would be of the greatest practical use and interest at the present time. After Otte's attention had been arrested by reading the quotation from Vincent of Beauvais, in Kreuser's book, he examined the tones of several bells of the fourteenth and fifteenth centuries, and found that there are two distinct orders of bells: they are either, according to the present system of musical notation, major or minor bells; that is, such whose middle tone between the octaves is the major third, or such whose middle tone is the minor third. The bellfounders of the present day, he thinks, make major bells only (being a saving of metal), whose proportions are as 5 to 4; whilst the proportions of the great bell at Erfurt, called "Maria Gloriosa," are as 6 to 5, and consequently it is, as Otte believes, a minor bell. The height of the bell is the least term in the proportion, and is always measured on an inclined straight line touching the upper and lower portions of the bell, and therefore not the vertical height. I measured the tenor bell of Holy Trinity Church, Coventry, a few days ago, and found its proportions to be nearly as 5 to 4: it was cast by Park, of London, in 1776. Otte further adds, that chimes composed of major bells, however well the fundamental tones may be in harmony, will nevertheless have a harsh effect on the ear. May not this partly account for the disagreeable effect produced by the Royal-Exchange chimes? Mr. Denison alluded to the great Erfurt bell, the exact dimensions of which I gave to him, as being, according to report, the finest bell in the world. May not its celebrity be owing in a great measure to its proportions, as well as to its material? or, in other words, are not bells which, when struck, produce minor chords to be preferred to those which produce major chords? If so, it follows that the customary proportions, being, I believe, nearly as 5 to 4, are not correct, and that the height should be increased $\frac{1}{24}$th of its entire dimension; that is, taking for granted the proportions given by Otte to be theoretically correct. However, there is still room for a considerable amount of investigation, theoretical as well as experimental, relative to the musical phenomena of bells.

The composition of bell-metal is also a subject not entirely exhausted: it is possible that three of copper and one of tin (the proportions common in Germany) may be the best compound; but there are, I think, reasons for questioning this, especially as regards the material. For instance; sound is not transmitted through all kinds of metals with the same degree of velocity. I learn from "Pouillet's Physics," that the ratios of the velocity of sound in tin, silver, copper, and steel, are as $7\frac{1}{2}$, 9, 12, and $16\frac{3}{4}$, respectively: may we not infer from this, that silver and copper will make a better alloy than tin and copper? if so, the tales we have heard and read about silver in bells must not be altogether neglected as purely mythic. I read in Otte's book, that Charlemagne caused 100lbs. of silver to be used instead of the customary amount of tin in a bronze bell which was made for him by a renowned bell-founder of that age. I think we have no right to suppose that silver was introduced in the alloy from mere fancy. The oldest bell known is that in the Cäcilienkirche, in Cologne: it is called the *Saufang*, and is made of three pieces of wrought-iron plate, rivetted together with copper nails: it is believed to be of the time of Archbishop Cunibert, who lived in the early part of the seventh century. In the first half of the ninth century, Walafried writes about two sorts of bells,—those made of wrought iron and those of cast bronze.

Mr. Denison has omitted in his list of large bells that of Olmütz Cathedral, in Moravia, said to be the largest bell in Germany: it is an old bell, and its weight, according to Otte, is 17 tons 18 cwt.

The question as to the best mode of hanging, which was discussed at length on the 11th instant, at the Institute, is also a knotty subject. Those who paid a tolerable degree of attention to what Mr. Baker and his mathematical friend said, must, I think, have felt very much inclined to adopt their notions: the mathematical formulæ, which were explained as resulting from an investigation of bells in motion under all imaginable conditions, I think fully established, in theory at least, the advantage of hanging large bells *high in the stock*. I fully expected, if there had been anything wrong in the formulæ, that Mr. Denison, with his well-known mathematical acumen, would not have failed to discover it; but all he said was, that there were some inscrutable laws of friction involved, which rendered the theory contradictory and nugatory. I do not think that this subject is so very difficult to settle, even if we throw theory out of the question altogether: for instance, let two bells of equal weight, say two tons each, be hung, one according to Mr. Denison's, or the old method, and one on Mr. Baker's improved principle, and let one man set *both* bells, allowing sufficient time for rest between the two operations, and note the length of time and quantity of exertion required for each: the result, I presume, will prove which is the best mode.

In conclusion, I think no one will for a moment question the fact, that when a bell is in motion, the strain on the bell-frame, and consequently on the tower walls, decreases in proportion, as the bell approaches to a state of equilibrium on its axis.

JOHN BURLISON.

INSTITUTION OF CIVIL ENGINEERS.

AT the meeting on March 4, Mr. Robert Stephenson, M.P. president, in the chair, the paper read was "On the Causes of Explosions of Steam Boilers," by Mr. William Kemble Hall, United States (America). In the course of it, the writer said, it was reasonable to suppose that the tearing of the boiler into several pieces, which generally accompanied explosions, was caused by a sudden exertion of power, and electricity had been suggested as an agent. But though electrical phenomena might be exhibited by the expansion of a jet of steam, it could not be supposed that a boiler, with its many direct and metallic connections with the earth, could be converted into a reservoir of electricity. If any were generated, it would be instantly conducted away. It had been supposed that the plates exposed to the action of the fire by the falling of the water had become overheated and decomposed. The steam, the oxygen of which had combined with the iron, and the hydrogen formed a gas, that had caused the explosion. But hydrogen would not explode, unless largely mixed with atmospheric air, which could not enter the boiler, except in minute quantities, forced through the feed-pump, in combination with water; and although there was evidence of the absorption of oxygen, in the rusting of the stays and of the interior surface of old boilers, it was too insufficient in extent to warrant the deduction, that there had been an appreciable change in the chemical composition of the steam. It might be possible to produce an external explosion, but not an internal one.

In the explosion at the Consett Ironworks, Gateshead, early in November, it was in evidence that the boiler had been blown out a short time previous, and the valve was not closed. The plates had been heated red hot, and it was supposed that the attendant, who was killed, had discovered the deficiency of water, and had just opened the feed-valve at the instant when the explosion occurred. Now, heat did not lessen the strength of iron up to the temperature of 550 deg.; and had it exceeded that point, in this case, and thus weakened the boiler, the result would merely have been a collapse of the flue. Water was not resolved quickly into steam by a red-hot surface. The excessive heat repelled the particles, and they were slowly evaporated by the communication of heat through the intervening vapour. No great pressure, therefore, could have been generated directly from this source. When heat was applied to steam, the increase of its pressure was governed by the same law that applied to air and all other elastic gases,—an addition of 480 deg. only doubling its pressure. Experiments had conclusively proved the possibility of heating steam in contact with water without also increasing the temperature of the bulk of the water, the upper stratum of which alone became heated by the contact. If, therefore, it was supposed, for example, that the steam had been heated to 435 deg. Fahrenheit, and water suddenly injected into it, the pressure would have been instantly raised to that due to the presence of the water,—determined by the experiments of Arago and Dulong to be 360 lbs. per square inch at that temperature. Or, to use another illustration, while 1,000 deg. of heat applied to steam would but increase its pressure, or volume, about three-fold, the same amount would multiply that of water 1,700 times. This vast increase would certainly be modified by the latent heat absorbed by the water in its conversion into steam, but served to indicate a sudden and local generation of excessive pressure, which might result in explosion.

Experience had proved, that the fusible metal plug, enjoined by law in France, became encrusted by scale, and otherwise rendered inoperative by use, and did not answer the purpose for which it was intended. The softer portions of a compound metal were forced out by the

pressure to which it was subjected, and the remainder, becoming oxidised, did not fuse at the temperature intended. It, moreover, acted merely as a warning, and did not serve to obviate the impending catastrophe.

All the contrivances hitherto adopted for the purpose of providing against explosions were designed to supply water, when that in the boiler had fallen to too low a level, or to open the safety-valve by the pressure of steam, independent of other circumstances. As had been illustrated by the examples alluded to, either of these plans would induce, in many instances, the very accident designed to be avoided. For there seemed every reason to believe that the great majority of explosions were occasioned by the negligence of the attendant, in permitting the level of the water to fall below the flues, exposing the plates to a high temperature, and surcharging the steam with caloric, far exceeding that due to its pressure. In injecting an additional supply of water into the boiler, when in this dangerous condition, it was thrown over the heated plates and into the super-heated steam, and suddenly converted into steam of too high a tension for the boiler; and so instantaneously, moreover, that it operated with all the momentum of a blow.

These considerations led to the conclusion that safety was alone to be attained by opening a water blow-off valve, when the surface of the water had fallen to a perilous extent, for the purpose of first discharging from the boiler the water, which was the more dangerous element, and then the steam; operating, in fact, as a safety-valve, in a more useful but less objectionable position than the present steam-valve situated on the dome. This system had been subjected to trial under heavy pressure, and had been found very successful.

In the discussion it was argued, that Mr. Hall's system, if properly carried out, would be extremely useful, and almost prevent the possibility of danger from explosion; but that it would only be of use when an explosion was almost inevitable, and that as prevention was better than cure, the utmost should first be done to prevent boilers reaching that state, still retaining Mr. Hall's valuable apparatus, in cases of all other means of prevention proving ineffectual. The majority of explosions were stated to arise from the practice of constructing the boilers with the fire-places in the flues, contrary to the system used in Cornwall, where they always arranged to have abundant boiler-room and slow combustion; but where flue firing was used, the boiler surface was too frequently deficient, and the firing rapid and generally forced.

PARIS AND LONDON HOUSES.

THERE seems to be a tendency on the part of the public to decry everything English, as compared with foreign: our mode of government, our laws, habits, manufactures, and now our buildings are depreciated.

Many letters have appeared in the newspapers, principally written by men who, apparently, are not qualified to judge, lauding the Parisian buildings, and speaking of the London system in a tone the spirit of which may at a glance be inferred.

Now, the reason of the street architecture of Paris being so much finer than ours is simply because we don't *want* it, because it won't pay, owing to the difference in our national habits. In Paris, a number of families living in floors over each other, a larger house is required than with us, consequently exterior ornament may be indulged in, as forming a less proportionate part of the total cost of the building, and the greater height of the houses so built gives them a more commanding appearance.

The same difference in our national habits gives an ample compensation for this in our suburbs. A good deal of harmless pleasantry is used in speaking of the ridiculous names given to the cottages, &c. in the suburbs; nevertheless, nothing around Paris can compare with these suburbs. I have lived in *the flats* of Edinburgh and Paris, and my humble opinion is, that it is well for Londoners that their tastes and habits have not induced them to adopt this practice. Imagine the consequences that might arise were the two and a half millions of London cooped up in a space less by one-third than its present site.

The Parisians say our street houses are *très bas:* be it so. Railways and omnibuses are plentiful; and it is better, morally and physically, for the Londoner, or any other inhabitant of a large city, when he has done his day's work, to go to the country or the suburbs, where he escapes the noise and crowds and impure air of the town; and it is no small advantage to a man to have his family removed from the immediate neighbourhood of casinos, dancing saloons, and hells upon earth which I will not name.

Much is said of model lodging-houses for the working classes: the true model lodging-house for them is a cottage *out of* London. Mr. Pearson has shown this to be quite practicable; and I doubt not it will be carried into effect when the railway companies can be moved in the matter. In the City, where the different floors are used as offices, it *pays* to build high houses, and they *are* built in a way equal to or better than anything of the kind in Paris. No sanitary reform can make a town as healthy as the country; as, even were all other sources of danger destroyed or removed by thorough drainage and cleanliness, the air breathed becomes more or less impure, even from the numbers of human beings and cattle crowded together. Therefore, the English system of building is more rational than the French, inasmuch as the health of a man is of more importance than the aspect of his house. Surely those who advocate the system of living in flats forget that families living in Paris die out in the third generation.

But it will justly be answered, "Those suburban streets, cottages, and villas, which you commend so much, are not built in so substantial or tasteful a way as the Parisian houses, even allowing for the difference in size and height of the two styles." Very true; but who is to blame for this? neither the much-blamed speculative builder nor the architect.

As an illustration, allow me to give a case which has occurred several times lately in my experience. Two builders each took a plot of ground to build upon: one built properly: the other built almost entirely with place bricks: his mortar was principally road-sweepings and horse-dung: his timbers were about half the right thickness: everything that did not meet the eye was scamped: but the front of his house was compoed over; his timber was covered with showy decorations, so that his houses looked as well as those of his neighbour. Well, this man who had built his houses at 20 per cent. less than the other, sold them all at a profit; and the other man who was *obliged* to sell at the *same price*, lost money by every house he sold.

Is it not evident that if twenty men are building near each other, eighteen of them honest, and two not,—if those two men *sell* their houses, those who buy them virtually give a premium to dishonesty, and compel the eighteen to sell at too low a price. Had those purchasers gone to a respectable surveyor, and said, "We have been looking at some houses, and wish to purchase, but A wants so-and-so for each of his houses, and B 20 or 10 per cent. less; will you, Mr. C. examine them thoroughly, and see if B has built as well as A?" then, the surveyor would go and do his duty, and I need not add, to the great delight of the honest builder, and *not* of the other; and the purchasers would, by the expenditure of a few guineas, have saved themselves from constantly recurring expenses to keep their cheap houses in repair.

The public don't mind paying the lawyer, but won't pay a surveyor; whereas, the latter is the more important of the two to purchasers of houses, who, by acting so, literally *prevent* builders from building properly.

In short, our *public* buildings, in my opinion, are as good as those of Paris, our architects as talented, our builders know their business as well, and if our street architecture be not so good, it is simply because the public will not *pay* either the architect or builder for building houses to compete with the Parisian ones. It is a mere question of £. s. d.; and I am sorry to see some architects joining in the cry lately raised; and, with, I think, a great want of thought, throwing the censure from the shoulders of the "public" on to those of the architects and builders. I was going to enter further into the question as to *why* the "public" don't *pay*, and yet *grumble*, but will stop, as it is too important and extensive in its bearings to be treated lightly or shortly. J. P. W.

FIBROUS SLABS.

THE dome of the new reading-room at the British Museum, now in course of completion under the direction of Mr. Sydney Smirke, is being lined with slabs or sheets of a fibrous material, for which a patent has been obtained, and which, combining many of the properties of wood, is adapted to almost every purpose to which the various descriptions of wood are applied. It is also applicable to many purposes for which marble, slate, lath and plaster, or internal brickwork, are now used: and the price, we are told, will not average more than one-half the cost of woodwork or other materials now in use.

To render wood available for purposes where the ordinary width of boards (9 to 13 inches) is insufficient, it is requisite to join two or more boards together, by what is technically termed "glueing up," an operation involving much labour, expense, and loss of time, and attended with all the contingent risks of shrinking, expanding, splitting, winding, &c. as well as natural imperfections. This fibrous material can be manufactured in sheets or slabs of any required thickness, length, or width. They are now made in sizes of 13 feet by 7 feet; but these dimensions may be greatly increased.

It appears to be uninflammable; a non-conductor of heat or sound; free from dry-rot, shrinking, expanding, splitting, or winding; easily worked or bent; and is applicable for large panels, ceilings, floors, and partitions.

Each panel at the British Museum, composed of three pieces, is 22 feet long by 11 feet 6 inches wide: and these, in their spherical form, are raised from the ground to a height of 110 feet, and fixed in one piece to the roof.

We have probably said enough to show that this new material deserves the attention of all who are engaged in building operations.

CHURCH-BUILDING AND PROVINCIAL NEWS.

Norwich.—Another side of the tower of the cathedral is now under repair.——The free library is being roofed in, and will, it is expected, be completed in three or four months.——The new workhouse is still under consideration, and the guardians are talking about procuring plans. A site has been purchased, and the land is found to contain excellent brick-earth; but it is not expected, under any circumstances, that the building will be commenced this year.——The consecration of the new cemetery for this city took place on Wednesday in week before last. The new cemetery is situated, on a high table-land, between the Dereham and Earlham roads. The site comprises about thirty-five acres. The present cemetery, however, includes only twenty-three acres; the remainder being let till needed. The approach from the Earlham-road, at about three-quarters of a mile from the city, is by an entrance-gate, of a light and ornamental character, with two side gates; and immediately within the gate is a lodge for the superintendent. At the Dereham-road is another lodge and gates similar to the first. The east side is appropriated to the Established Church; the west to the Dissenting communities. The grounds are ornamented with a variety of trees, and clumps of shrubs. In the centre are two mortuary chapels, similar in design, with the exception of a belfry (not yet finished) to the Episcopal one. They are of red brick, with black brick strings and diapers, and moulded with white brick and Caen stone dressings. Their architectural character is Early English, with apsidal chancels, and lofty entrance-porches, beneath which a hearse can pass. The outside of the chapels, says the *Norfolk Chronicle*, referring to them, is by no means remarkable for beauty or dignity, the unusually steep pitch of the roof giving an

unpleasing effect. Each chapel in the interior is 86 feet long, and 24 wide, and is paved with York flags in the centre, with a 3-feet border of fancy red, white, and black paving-tiles on each side. There are pews, capable of accommodating 100 persons. Behind the reading-desk is a bay, lighted by nine long narrow and lancet-headed lights. The body of the chapel is lighted by ten windows, of a similar character, filled with tinted glass. The wood-work is deal, stained and varnished, and the roof is open, filled in with plaster between the rafters. A small chapel has also been erected on the ground appropriated for the Jews, which, with the lodge entrance-gates, are all built of similar materials to the larger chapels. The designs were furnished by Mr. Benest, the city surveyor, and the buildings were executed by Messrs. Ling and Balls, whose contract amounted to 1,990*l.*

Hempton (*Norfolk*).—A building, designed as the chancel of a future church, is being erected in this parish, under the superintendence of Mr. J. H. Hakewill, architect. It is in the latest style of Early English work, of faced flints, with Caen stone dressings for plinth, string-course, windows, and buttresses. The internal dimensions are 35 feet 6 inches by 16 feet 6 inches, and it will accommodate 100 persons. The parish, containing nearly 500 persons, has been left entirely unprovided for since the Reformation, when a priory church was demolished, in common with the other buildings of the establishment, and the tithes alienated. Consequently, the building, now in course of erection, will be licensed, in the first instance, for divine service, as it cannot be consecrated without endowment. It is expected that the works will be completed, and the church opened, in June or July.

Braintree.—The church of Braintree, in Essex, stands much in need of repair. Some time since an appeal was made to all disposed to aid in this good work, as it was impossible to raise more than a few hundred pounds in the parish itself. The fabric has been examined by an architect, and the estimated sum requisite amounts to 4,000*l.* Rather more than was anticipated seems to have been subscribed in the parish, where about 850*l.* were realized, and the patron has subscribed 100*l.* the Archbishop of Canterbury and the Bishop of London, 10*l.* each, &c.

Reading.—Finchampstead Church has been reopened, after having been restored and repewed, from designs and under the superintendence of Mr. J. B. Clacy, of Reading. The church now contains about 215 sittings, of which about 140 are free. The nave is open to the roof, showing the oak framing, and having the various arches decorated with scrolls of illuminated texts. The chancel, a circular apse, has an oak panelled ceiling, with carving. The open benches (those in the chancel with ornamented ends) are of a suitable character. The pulpit and reading-desk are of carved oak. The east and two of the north windows are glazed with coloured and ornamental glass.

Shepreth.—In consequence of the church here having been closed by the incumbent, on account of its dilapidation, an archdeacon's court was held, at which the churchwardens were cited to appear. Mr. Bradwell, architect, was examined, and stated that he had inspected the church: it was utterly unsafe for anybody to sit in. The judgment of the court was, that the churchwardens be directed to repair the church forthwith, and pay the expenses of the citation.

Dorchester.—Mr. H. Blandford has obtained the contract for laying out the ground of the cemetery here, at the sum of 80*l.*

Birmingham.—The foundation-stone of the new vestry-hall for the parish of Edgbaston, about to be erected in New Bridge-street, was laid on Monday before last. The building, which is being erected by Mr. Cresswell, from the designs of Mr. Fiddian, will be of brick, ornamented with Chance's patent basalt dressings, and will comprise a room, 98 feet by 28 feet, in which it is intended to hold all public meetings in connection with the parish, and suitable provision will be made for the accommodation of the out-door poor.

Liverpool.—The consecration of All Souls' Church, Vauxhall-road, took place on Friday in last week. The church is cruciform, the greatest length being 110 feet, and the breadth of the body 42 feet. There are a tower and spire at the south-west corner, the entire height of which is 105 feet, the tower being 50 feet, and the spire 55 feet. There is a gallery at the end of the nave, and a smaller one at the end of each transept. The transept galleries are entered from the outside, by winding stone stairs in turrets. The chancel is lighted from the ceiling: the vestry is on one side of it, and the organ recess on the other. The walls are of rock-faced Woolton stone lined with brick; the tower and spire stone throughout. The general style is Decorated Gothic. The roof is formed of arched principals, covered with cross braids, on which are laid the slates. There are two opposite entrances—one through the tower, and one through the opposite porch. The entire accommodation is 950, of which 646 are free. The whole undertaking comprised the purchase of land, the erection of a church, the erection of suitable schools, and of separate residences for the master and mistress, and the erection of rooms for ragged schools, industrial classes, &c. The erection of the church has been completed, and of the industrial class-rooms underneath it; and the new schools and residences will be proceeded with at once. The outlay necessary for completing the whole undertaking, according to the local *Journal*, will fall very little short of 10,500*l.*——The "Catholic Apostolic," or Irvingite Church, which stood for some time partly erected in Canning-street, from a Gothic design by an amateur architect, who seems, according to the *Journal*, to have been also his own paymaster, has now been nearly completed, by Mr. Trevor Owen, of Birmingham, architect. The edifice is not being completed entirely according to the original intention, but so as to accommodate a larger congregation. The masonry is executed in freestone, from the Stourton-hill quarries. The western entrance has pinnacles, with carved crockets, finials, and bosses; and the southern side is enriched by a small tower in connection with the south transept, surmounted by a lantern and spiril, and four carved pinnacles, finished with stone finials and gilt cross. The tower rises over a baptistry, in which will be a stained window with baptismal subject. There are large traceried windows in each transept and over the west door, which, together with the smaller ones, and the building generally, are executed in the Flamboyant style of architecture, as nearly as circumstances would admit, in accordance with the more expensive richness of the eastern portion. The nave and transepts are covered by an open timber roof, stained and varnished; the windows glazed with mellow tinted glass. The length of the church is 121 feet; the width, 39 feet; and the height, 60 feet. The fittings will be of yellow deal, stained and varnished. The floor will be laid with red and blue hexagonal tiles, but not encaustic. The contractor is Mr. T. Hughes. Mr. B. Brierly executes the stonework. Mr. R. Grey is clerk of the works.——A mural monument in memory of the late Rev. John Johns, minister of the Liverpool Domestic Mission Society, has just been erected in the scene of his public ministrations, to commemorate his services. It is in the Tudor-Gothic style. The designer and sculptor was Mr. M'Bride, of Liverpool. To prevent the eye resting on bare columns, says the *Albion*, the lily is sculptured with the thorn intertwined around the one; the vine, and grape, and wheat around a rustic cross on the other. The epitaph is in old English ecclesiastical and illuminated characters tinted ultramarine blue, with the capitals vermilion.

Birkenhead.—At a public meeting of the ratepayers, recently held, it was unanimously resolved to adopt the Public Libraries' Act of 1855, for this district.

St. Helen's.—The St. Helen's Improvement Commissioners have increased the salary of their surveyor, Mr. McManus, from 150*l.* to 200*l.* per annum.——Baths and washhouses have been long spoken of as being required for St. Helen's. It is to be hoped that, with other sanitary improvements, so desirable a boon will not be long deferred.

Blackburn.—A new Roman Catholic school is to be erected at Over Darwen. The plans and specifications have been prepared by Mr. Birtwistle, of Blackburn, architect, and the contract will be let for immediate execution. The foundation-stone will be laid on Easter Monday. The edifice will be 72 feet long, by 28 feet wide, and will afford accommodation for 250 boys and girls. When completed it will be also used for divine service till a chapel has been erected on a plot of land adjacent.

Barnsley.—Mr. William Shaw, of Stanley-hall, near Wakefield, has given the stone and sand required for the erection of a new church in St. John's district, Barnsley. The stone will be obtained near the site chosen for the erection of the church, namely, on Barebones, and is said to be of durable quality, and the same as that used in building the Independent chapel now in course of erection in this town, to which Mr. Shaw, who is an Independent, contributed largely in material and money. The Ripon Diocesan Church-Building Society have also intimated their willingness to give 460*l.* towards the erection of St. John's church.

Wigan.—On Tuesday before last, Mr. Mangnall, the architect of the new workhouse, visited Wigan, and with Mr. Fairclough, the contractor, proceeded to mark out the ground (the purchase of which is now completed) for the erection of the building. Considerable progress has already been made with the excavations, and it is expected that in the course of a few weeks the foundations will be got in.

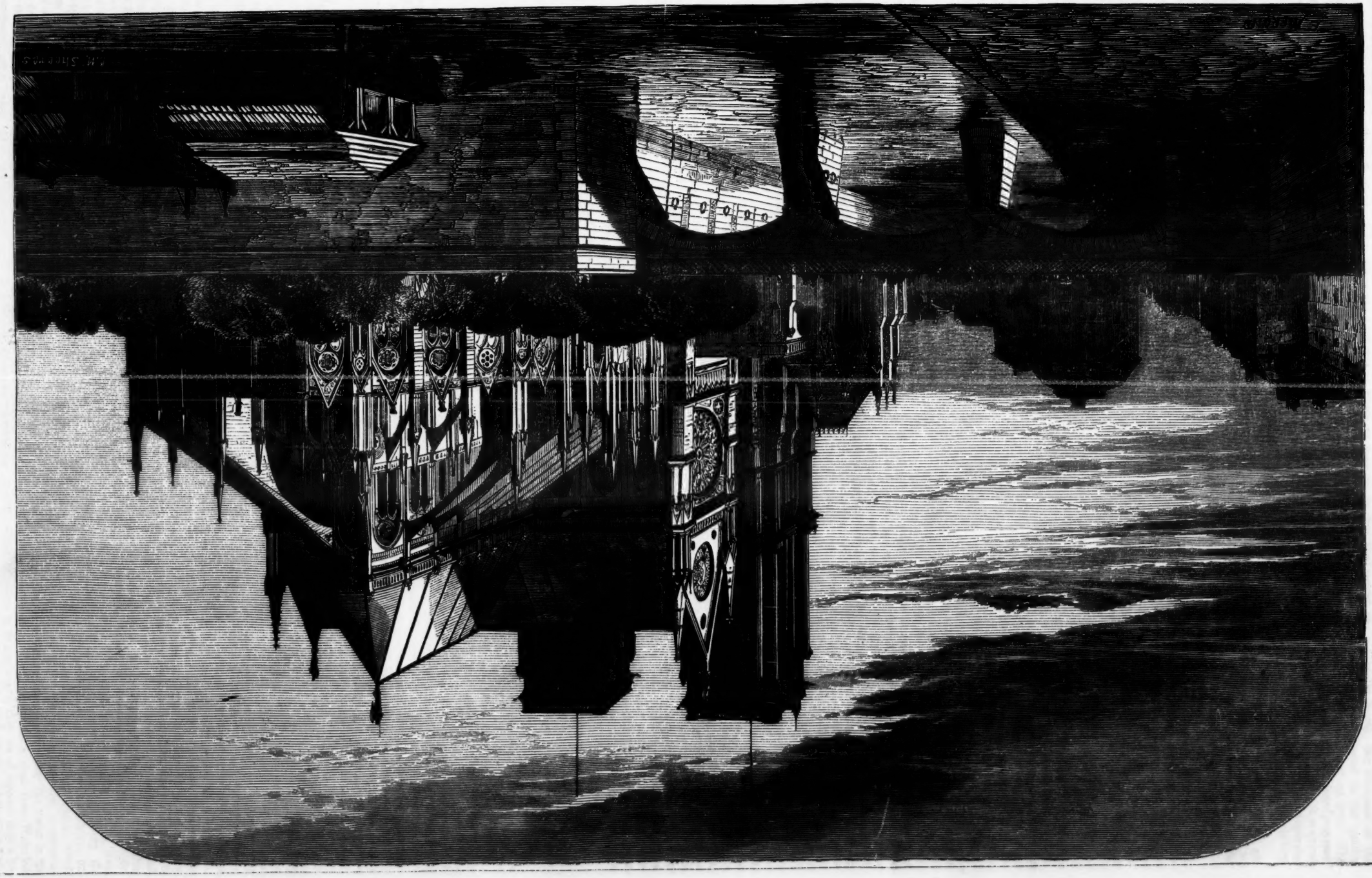
Methley.—We have from time to time during the past six years had occasion to notice the works of restoration which have been proceeding gradually (under the direction of Mr. Hugall, of Cheltenham) in Methley Church, Yorkshire. During the last week, according to the *Leeds Intelligencer*, two stained glass memorial windows, by Mr. Wailes, have been inserted in the north side of the nave. The westernmost one is an offering by Mr. Hollings, and contains, in the three lights, groups representing Our Lord's calming the tempest, His healing the blind, and raising the dead. The eastern one, inserted by Mr. Burnley, contains Our Lord's entry into Jerusalem, His purging the Temple, and Mary anointing His feet for His burying. In the tracery of the heads of the two windows are angels with memorial scrolls from the burial service.

Edinburgh.—Trinity College Church is at last, it appears, to rest its old stones at the Calton-hill, on the site of Burns's monument, which is to be removed, to make way for the re-erection of the church, whose numbered stones have been destined for so many different sites, year after year, since the railway authorities had it removed from its own original site, near the north bridge of the city. The Lord Provost has, it may be said, the sole responsibility of the recent rather strange decision, as it was by his casting vote the matter was decided. Why that precise spot on which Burns's monument stands, on the flank of the Calton-hill, should be selected, to the exclusion of all others, we do not know, but there seems to be an opinion in the city that it is *not* a suitable site for a church; and, at any rate, when the monument to a national celebrity, such as Burns, is once erected, there cannot be a greater contempt or insult to his memory than to pitchfork it out of its place, in order to make way for any other project. To talk of procuring a better site, under such circumstances, is a mere blind. Once taken to pieces, it is even a risk whether it ever be re-erected at all. How many years have the stones of Trinity College Church itself been seeking a site, and they are not re-erected even yet! And the difficulty is not likely, we hope, to be got rid of in this way, only by creating another of a similar kind. Mr. George Harvey, R.S.A. suggests a doubt as to the propriety of the site, by recommending the adoption of the Continental plan of indicating the bulk and proportions of the proposed re-erection by means of poles and canvass, or a wooden frame, that the effect may be judged of.

THE PROPOSED NATIONAL PORTRAIT GALLERY.—In reply to the address voted to her Majesty in the House of Lords, relative to the expediency of forming a gallery of national portraits, it has been intimated to their lordships that her Majesty will direct an inquiry to be made as to how the object in view may be best attained.

NOTRE DAME OF PARIS: SOUTH-EAST VIEW.

[See p. 137, in present number.



ARCHITECTS' BENEVOLENT SOCIETY.

THE annual general meeting of this society was held in the rooms of the Institute of Architects, on Wednesday, the 12th instant, when Mr. Sydney Smirke, A.R.A. presided. Mr. John Turner, the honorary secretary, read the report of the council.

"Our annual receipts," the report said, "have been larger; our number of members has become greater; and whilst the amount of relief afforded has been about the same as last year, the sum funded in the name of the society is materially increased. This latter circumstance is due to the great liberality of members during the year in donations, distinct from their annual subscriptions: Mr. Hardwick, Mr. Bryce, of Edinburgh, and Mr. Fuljames, of Gloucester, have each forwarded to us ten guineas. Our kind and zealous friend, and liberal benefactor, Mr. Cockerell, has presented to us five guineas, Sir Robert Smirke, five guineas and a half, both in addition to their former donations; and other donations have also been made to an amount exceeding any one year since the first year of our existence."

The Report further showed that in consequence of the resolution passed at the last meeting, applications had been made to gentlemen in all the largest cities and towns, requesting them to become corresponding members of council, and up to the present time the following twelve gentlemen had accepted the proposal, viz. Messrs. Banks, Wolverhampton; Dobson, Newcastle; Hine, Nottingham; Stevens, Derby; Williams, Liverpool; Holden, jun. Manchester; Lanyon, Belfast; Atkinson, York; Hill, Birmingham; Hayward, Exeter; Fuljames, Gloucester; and Kennedy, Glasgow. The subscriptions for the past year amounted to 147*l.* 17s.; the donations to 79*l.* 18s. 170*l.* had been distributed in relief.

Mr. Thomas Little, Mr. Geo. Mair, Mr. Mocatta, Mr. C. C. Nelson, Mr. A. Poynter, Mr. David Moore, Mr. R. Brandon, Mr. W. Papworth, Mr. M. D. Wyatt, and others, were present, and took part in the proceedings.

ELECTION OF DISTRICT SURVEYORS.

AT a meeting of the Metropolitan Board of Works on the 7th inst. the following gentlemen were appointed district surveyors by show of hands; viz.—For Penge, Mr. Nash; Plumstead and Eltham, Mr. Williams; Putney and Roehampton, Mr. Sancton Wood.

The Board have confirmed the decision of the committee as to the district surveyors of Tottenham and Hornsey (p. 121, *ante*); thus justifying the opinion we expressed, on the passing of the Act, in opposition to some authorities.

THE RUINS OF LINDISFARNE, NORTHUMBERLAND.

FEW who have seen the fragment left of this beautiful structure will forget the symmetry of its proportions and its picturesque island situation. Looking at it across the calm sea, in the sunset, at early morning, or in the moonlight, we have often wondered at the skill of those of former times. When the raging storm beat against that dangerous coast, the pure forms of this choice piece of architecture were not less striking, and often have we regretted, that, piece by piece, this venerable ruin was allowed, without a helping hand, to fall to pieces. Even *wanton mischief* has at times been used to effect the destruction of "this thing of beauty." Besides, the island of Lindisfarne is rich in historical and other associations: so is the surrounding neighbourhood; and any of our readers travelling to the north, and who can spare a day, might well employ it by stopping at the station near Bamborough, to visit that grim stronghold of former days; the Farne Islands inhabited by immense flocks of various seabirds; the remains of ecclesiastical buildings, planted there long since, so that the beacon might be lighted to warn, and the hand ready to help, the unfortunate mariner who might be here cast ashore. Here are also Grace Darling's lighthouse and the ruins just mentioned.

Those who know Lindisfarne will remember the large zig-zag arch which formed an important feature of the building. This was blown down about two years ago, and the attention of the Duke of Northumberland having been directed to this, we are very glad to learn, that with as little delay as possible, his Grace requested Mr. Salvin to see what could be done under the circumstances. For some time past Mr. Salvin has been at work. He has gathered together the fragments of the arch, and replaced them; strengthened other weak parts, searched the island for scattered fragments, replaced them when possible, and without destroying the appearance of the ruin which renders it so attractive to artists, made it so secure that it is likely to bear up against the fierce winds for some time to come. This is a creditable work, and we hear that it is not the only instance of the care which the duke has taken of the antiquities on his wide domains. Many places have been restored; and when this was not practicable, careful drawings have been made on the spot of such parts as were likely to perish. Mr. J. W. Archer, we understand, is still so engaged.

A MANUFACTORY OF ULTRAMARINE AT NUREMBERG.

THE manufactory belonging to Messrs. Zeltner and Heyne has acquired a European reputation, and sends its produce to all parts of the globe. Its exterior aspect is somewhat imposing, the whole being surrounded by a wall, and one of the buildings looks rather like a fortress, the entire space occupying an area of seven Bavarian acres (*Morgen*). The central building consists of a polygon of twenty-four sides, with ninety-six furnaces, arranged in twelve compartments with as many high chimneys. Thence issue twelve branches of rails to all parts of the manufactory, being provided at the intersecting points with turning platforms. From the upper stories similar rails of wood are laid; the iron rails being 4,500 feet long, the wooden ones a trifle less. If we enter the polygon, which has a diameter of 136 feet, and is surrounded by buildings 300 feet long, and two stories high,—the dim of twilight gives the idea of being in the pit of a mine. All these buildings are vaulted and bombproof. The departments of this manufactory are manifold. In the middle is a building for mechanical contrivances, with two steam-engines; to the east the above polygon; towards the west a high-pressure engine, with a mill and a washing apparatus. The mills have twenty-eight troughs, and are mostly of cast iron; of the two stores one is 300 feet long, and this alone can hold 3,000 to 4,000 cwts. of ultramarine. A swinging rail transfers the colours from one end of the building to the other. Covered passages connect the single buildings, and there are seven large roads and six courts, presenting everywhere a fine perspective. Towards the west is a long row of drying-houses, in which a constant tropical heat is to be maintained, so that winter loses its power in all the vicinity. The merit of the discovery of artificial ultramarine belongs to Professor Gmelin, who died in scanty circumstances. This manufactory arose in 1839, and the proprietors preserve yet the weather-boarded shed in which they began business. The manufactory employs 200 workmen, of whom 180 are married. They have established a sick fund, and a pension fund for widows, orphans, and invalids, as well as a singing chorus. The best blue artificial ultramarine has to pass eighty different processes until it is ready for use, and is now applied to the colouring of cotton and wool-stuffs, tapestry, paper, sealing-wax, &c.; besides its purely artistic use.

AUSTRALIAN NEWS.

AT Sydney, New South Wales, the opening of the Sydney and Parramatta Railway, on the 26th of September last, excited some attention. The principal works on the line were,—750,000 cubic yards of excavation; twenty-seven bridges and fifty culverts; one viaduct over Long Cove Creek, and tunnel at Chippendale; two terminal stations erected, and four intermediate ones, besides workshops and other buildings. The stations are chiefly constructed of timber. The present rolling stock of the line consists of four engines and tenders, from the manufactory of Messrs. Robert Stephenson and Co.

The total revenue at the disposal of the City Commissioners of Sydney for the last year has been 71,998*l.* and their total expenditure 66,538*l.* The commissioners report that during the year ninety streets, comprising a distance of seven miles, had received a share of their attention. Acting on the principle that no street can be properly formed until kerbing and guttering be laid down, they have expended a considerable sum for that purpose, having laid down 10,144 feet of dressed stone kerbing, and 30,030 square feet of draft and axed guttering. There are two inspectors of nuisances. During the year, 500 new buildings have been erected, and fifty-three buildings enlarged. The commissioners beg for a Paving Act, to compel each citizen to pave before his own door. In order to commence a system of sewerage on a sound basis, a trigonometrical survey of the city has been commenced, which will cost 3,000*l.* The commissioners have eked out the supply of water obtainable from the Lachlan Swamp; but they have also made preparations to secure a more permanent supply. They have contracted for 10,000*l.* worth of piping to be laid down in the streets of Sydney, and a quantity of 30-inch main to convey the water from Botany to Sydney. The commissioners have also sought the aid of Dr. Smith, the Professor at the Sydney University, who has reported on the quality of the water, and the action of water on iron. The drawings of the necessary steam-engines were prepared, and the plans and specifications for the work required nearly finished, so that before long the apparatus for supplying Sydney with water will be in working order.

At Melbourne, in Victoria, the golden times are fast becoming "copper" times. Three-roomed stone and brick cottages are now advertised to be let at 8s. per week, for which 4*l.* to 6*l.* was once demanded as the weekly rental.

At Adelaide, in South Australia, there is not much new in the building trades. Sawyers, according to the *Adelaide Observer*, have had a good field opened to them, in consequence of a large contract for the supply of red gum timber to the Gawler Town Railway Commissioners having been taken by the River Murray Navigation Company. In accordance with the stipulations, about 2,000 loads must be supplied within twelve months.——A plan of a proposed school-house for sixty children, in the Kondoparinga district, with schoolmaster's residence, drawn by the district chairman (Mr. Scown), was submitted to a meeting held on 17th September last, and being approved of, specifications were requested of the chairman, that tenders might be forthwith advertised for. ——A Wesleyan Chapel is in course of erection at North Adelaide. It is to be in the Gothic style of architecture, with open roof of carved and stained wood, and on the outside supported by flying buttresses. It is intended to contain 1,000 sittings, and, ultimately, by the erection of galleries, to accommodate many more persons. The first cost will be about 6,000*l.* Of this sum about 1,150*l.* had been collected, end of October last, and the foundations were already laid. ——Designs for St. Bartholomew's Church, Norwood, were submitted by Mr. Hargrave, at a meeting reported in the *Adelaide Observer* of 27th October last. It is to consist of a nave measuring 56 feet 6 inches, by 26 feet, with a side-aisle 45 feet by 17 feet, a chancel 16 feet square, and a porch 10 feet by 6 feet; the style to be early English, and the total cost 2,000*l.* At present he proposes to erect only the aisle, which will accommodate 144 persons, and cost, with the necessary fittings, about 450*l.* The designs were approved, and the Building Committee empowered to accept contracts for the erection of such portions of the building as it was proposed to raise, such contracts not to exceed the amount of funds actually subscribed.——A fund was being raised about same time to defray some expenses incurred in the erection of a gallery and an extension of the sittings in All Saints' Church, Hindmarsh. The total cost of the gallery was about 136*l.*

THE PROPOSED ROAD THROUGH ST. JAMES'S-PARK.

THE report of the committee appointed to consider the best means of improving the communication between those parts of the metropolis lying on the north, south, and south-west sides of St. James's-park, has been presented by Sir Benjamin Hall to the House of Commons. The committee report on the several plans,—1st, for opening a road from Pall-mall through the site of the German Chapel, and across the water in the park by a bridge to Birdcage-walk at Queen-square,—2nd, the line through Cleveland-row, and in front of Bridgewater House, into the Green-park, and curving thence by the front of Buckingham Palace to Buckingham-gate, near the Duchy of Cornwall office,—3rd, the road from Waterloo-place southwards to the mall near the Duke of York's Column, and to near Storey's-gate,—4th, the proposed opening from the site of the Globe Insurance Office, in Charing-cross. The committee do not think it desirable to intersect the ornamental gardens of the enclosure, as proposed by the first plan. The expense of the second they find would be no less than 163,250*l.* They therefore recommend, in order to effect a communication between Pall-mall and Pimlico, that so much of the road proposed in plan No. 1 as lies between the entrance to Marlborough House and the mall, be made, and that the line be continued along the road now used on the north side of the mall, to a point marked E at the western end of that road, and thence to Buckingham-gate. The road thus opened might be enclosed, as the drives in Hyde-park are. The probable cost of the opening from Pall-mall, and the necessary works including the taking down and rebuilding the German Chapel, exclusive of purchase of site for the new chapel, would be about 25,000*l.* The committee also recommend that a footbridge be thrown over the water in the enclosure. With regard to a road from Waterloo-place to Storey's-gate, they are of opinion that a line of communication should be made, and that the Duke of York's Column should be removed. The cost of

this line, including the removal and rebuilding of the column would be about 30,000*l*. As regards an opening from the park to Charing-cross, the committee state that they "are not prepared to recommend that such an opening be made at present, but they are of opinion that an opening for carriages should be made from Trafalgar-square to the park."

It thus appears that to a certain extent the plans long since urged in our pages are now likely to be carried out. As for the removal of the Duke of York's Column, we think it would be very desirable to avoid that if possible. Such an opening as that suggested would certainly be a great convenience, and if it could be accomplished by a suggested modification of the plan, without removing the column, good and well; but it seems to be overlooked that the view of the column and steps from the park forms one of the chief features of the locality. Building up and pulling down again, is a dear way of adorning the metropolis.

THE "BUILDER'S" SMOKELESS FIRE.

YOUR valuable notice of the new mode of making a fire in a common grate, which shall save coal, and consume a greater part of the smoke, only requires universal adoption to become one of the greatest blessings conferred upon us in this smoky—*ergo*, dirty—metropolis. Properly carried out, it would effect a perfect revolution in stoves, chimney-sweeping, fires from foul flues, price of coals and coke, safety from fire by shooting coals, smoky rooms, cinders and dust (the whole of which are nearly consumed), cleaner linen, brighter atmosphere, and sounder lungs. I have ever been a great advocate for giving due credit to Mr. Cutler for his admirable introduction of this principle more than thirty years since, when his patent was crushed by a combination of the trade, who dreaded the success of the patent. His more rational opponents afterwards acknowledged its value; and one stove-maker, who would not join the combination, a few years since, in a work on stoves and chimneys, eulogised the principle, and ignored the decision. His remarks on this crushed patent, the writer fully believes, first led Dr. Arnott to investigate the subject, and to produce the now-called Arnott's self-consuming, smokeless stove; but as simplicity is the greatest charm in all novelties, either patented or not, I conceive the suggested and successful process, applied to the common stove, and immediately at the service of all, without screws and levers, or an expensive smith's, ironmonger's, bricklayer's, or mason's bill, is a most valuable boon to society,—if society will only universally adopt it. I say *if*, for it is proverbial what an obstinate person John Bull is. I think insurance companies should especially request, or specify to this mode, as particularly safe, until some more stringent means be ordered and enforced. Furnace chimneys no longer are permitted to pollute the air, and vomit out their smoke; why, then, should, *in the aggregate, a far greater nuisance*, be for one day permitted to continue, when the public would infinitely gain, in every way, by the change. On seeing the notice in your journal, I at once resolved to try the new method, with, I must say, certain misgivings. With my own hands I adjusted everything, even to the paper at the bottom, and built up to the top bar with coals; then formed a sort of crows'-nest, of paper, shavings, and wood, and covered it lightly over with thin pieces of coal. Judge of my horror, on entering my room the next morning, and finding my servant had taken it all to pieces, and laid the fire in (I shall now call it) the antique way: fortunately, it was not lighted. I therefore had it again pulled to pieces, and replaced as I had laid it, and lighted. The next few minutes were most anxiously passed, fearing I might become the laughing-stock of family, servants, and all. What was my delight, however, when I saw the coals igniting one by one, and in half an hour, without bellows, or clouds of smoke, a most cheerful fire: it was lighted at nine, and by one o'clock it was so fierce, that I was obliged to pour water on it, to keep it down. This occurred after the paper at bottom had become burnt, the draught being greater. I may also add, that I have continued each day the new process, only substituting *sheet iron* at bottom, in place of *paper*. The comfort and cleanliness are beyond all conception, without considering the economy. Fire-irons are scarcely needed, it burning gradually downwards for hours, according to the depth of the stove. The deeper the stove the longer it burns. I have placed a fire-brick at the side of my stove—an ordinary parlour one,—owing to its being wider than its depth. I would strongly urge all persons not only to adopt the process, but to recommend it for general use. E. R.

SOME of your readers have adopted with much interest the mode suggested in your publication "How to make a Fire in a common Grate which shall save Half the Coal and burn the Smoke." That mode, although valuable, has objections with some, which supplying a fire with coal under it may not have with others.

If any of your readers could, therefore, show a simple plan, which may be practical, thus to supply coal to a fire in an ordinary parlour-grate, it might furnish the most valuable means to the object suggested—namely, economy and cleanliness,—would prevent the nuisance from smoky chimneys,—as well as greatly oblige one desirous of adopting the best means of making and keeping up a fire. COLCHESTER.

WHILE on the subject of stoves, I may mention that too little attention is paid to the subject both by purchasers and makers. I maintain that no grate ought to be deeper than 5 inches from back to front: let the increase be in length: use nothing of metal but the bars: the covings, back, and sidings should be of fire-brick. Having turned a good deal of my attention to this subject, my experience has brought me to the conclusion that Nicholson's [Leslie's?*] form is the best, having no bottom. I have three of this sort in use, of different sizes. If bottom-grates are used, they should be made very fine. I humbly differ from Dr. Arnott about the height at which a grate should be set. About 4 inches from the ground, I venture to say, will be the most agreeable in use for many reasons which are too long to occupy the space in which valuable matter may be placed. All I add is, try the high grate and one set low.—A. Z.

In your impression of February 2nd you publish an account of a novel method of making fires, viz. by lighting them on the top, and making them burn downwards. Will you allow me to acquaint your readers with an improvement which I have recently effected in the antithetical art of making fires burn *upwards?* In lighting fires by the ordinary means, the wood is placed at or near the bottom of the grate, and the fuel to be lighted is placed upon it. By this means there cannot be a free passage for air through the fuel, and much trouble is occasioned in coaxing the fire to burn up; and frequently it has to be lighted over again. To remedy these evils, I have tied together sticks of wood, and given them the form of a hollow truncated cone or pyramid, five or six inches high. I place this in the fireplace on its broad end, and surround it with the coals and cinders to be lighted, *leaving the aperture at its top uncovered.* On lighting a piece of shaving placed within this simple form the effect is very striking. The air rushes in from below to feed the fire, driving a jet of flame upwards through the neck of the cone, which is immediately available for cooking, &c.; while other portions of flame are driven by the expanding air within the cone, laterally between the sticks, and made to light the coals, &c. W. H. N.

THE STYLE OF MODERN STAINED GLASS.

I TRUST Mr. Street will pardon my answering him and Mr. Oliphant together, as most conducive to brevity. I am afraid Mr. Street is himself an example of the prejudicial effect he deprecates, of a preponderating study of architecture, in his own case, else he would scarcely have quoted Mr. Ruskin against me. Does he not perceive that the "pretty pictures" Mr. Ruskin so properly condemns as unsuitable to glass are precisely the same which I have myself condemned, in the very discourse to which he takes exception? Mr. Ruskin was talking of the modern German school and its followers. Passing by certain inaccuracies in his statement, there does not seem to be any real difference of opinion between Mr. Ruskin and myself. I, too, quoted the twelfth and thirteenth century windows with admiration; but I moreover asserted that other windows were likewise most beautiful. And when I referred to a class, including such examples as those in the eastern part of Lichfield Cathedral, I am sure that Mr. Street will admit, in common candour, that I had in contemplation works widely different from the modern German; works, in short, which Mr. Ruskin has never condemned; nor, with his just appreciation of tone and colour, is ever, I apprehend, likely to condemn. If Mr. Street would condescend to *read* what I have written on the subject, and refer to the examples I have quoted, he might, perhaps, find the discrepancy between his own views and mine not so great as he imagines; but with that I am not at present concerned. It is true that I have advised the patrons of the art by no means to discard pictures in glass extending beyond the limits of a single light. But I have never advocated an exclusive preference for such designs. I have said, adverting to the great variety of designs in glass, that sometimes one, sometimes another, is preferable. And if I have expatiated at greater length on the merits of the more extended subjects, I have been compelled to do so by the dead set made against them. Mr. Street differs from me in opinion as to the effect of mullions cutting a design. But, when he attempts to undermine my opinion, I must repeat that it is by no means mine alone, but the opinion of a great many living men (to say nothing of antiquity) who have adopted it, certainly without any reference to me. Of these, some are professional artists; others are persons, who, from their attainments and knowledge of art, are quite as capable as any of forming a sound and consistent opinion on the matter. It is not my habit to drag the names of even casual acquaintances into a controversy, so Mr. Street must be content with my word. As for my remarks on Gothic architecture, which Mr. Street deplores, I but expressed my conviction. The old Gothic, which is grand and dignified, and honestly displays all the art of the period, I do admire. But the modern always appears to me more or less affected; to be invariably (I know not whether necessarily) associated with a degree of art far beneath what has been exacted during the last three centuries at the least; and to be apt to contrast but poorly with modern works in the "Pagan" style. The crincum-crankum small-windowed modern mediæval residences at the west end of the Abbey, though built of stone, are inferior, in effect as well as comfort, to the stuccoed mansions in Belgravia and Cubitopolis, which, by the way, shows that there must be something good in the "Pagan" style after all, for compoed "Christian" architecture is admitted to be deplorable. Perhaps, if a higher tone is imparted to the painted glass and figure sculpture in Gothic architecture, I may relent; but an enormous reformation will be requisite in both. In conclusion, I assure Mr. Street that I applied the epithet he quotes to some persons who, no doubt, have annoyed him, as well as others, by their consummate ignorance and conceit.

Upon Mr. Oliphant I shall expend but few words. The style of man is shown by the style of his communication. He is unmasked by my having, in consequence of his employment as a draughtsman by some inferior glass painters, unavoidably condemned his own works in condemning theirs. He is moreover bound to endorse the current opinions of "the friends of the movement" whose patronage he is now soliciting on his own account. I am not in the least afraid of any of my arguments being shaken by criticism such as his: and if by attacking me he is likely to gain notoriety, he is quite welcome to do so as often and as fiercely as he likes. C. WINSTON.

* Mr. Nicholson holds a license from Mr. Leslie.

WORKS OF MODERN PAINTERS IN THE CRYSTAL PALACE.

MR. MOGFORD has been engaged by the Crystal Palace Company to collect and superintend a gallery of Modern pictures of all the schools of Europe, to open in the month of May next, in the north wing of the palace, which will be constructed properly for the display of the works.

Five per cent. will be charged on all sales. Pictures previously exhibited are eligible, and every picture (from the space disposable) may be well placed for viewing.

Mr. Mogford will leave London next week for the continent, to collect the foreign pictures.

METROPOLITAN BUILDING ACT.

RUINOUS BUILDINGS IN THE CITY.

AT Guildhall, on the 5th instant, Mr. Henry Ernest and Mr. William Miller were summoned before Aldermen Finnis and Cubitt, to show cause why the magistrates should not issue their order to pull down certain premises, situate at 98 and 99, Cheapside, the surveyor to the Commissioners of Sewers having surveyed both houses, and certified that they were in a dangerous condition, and required pulling down.

Mr. Tyrrell, the solicitor to the Commissioners of Sewers, stated that a complaint had been made by the inhabitants of Cheap Ward with regard to the nuisance arising from the hoarding which had been standing in front of the premises in question for the last three years, and the Commissioners had ordered their surveyor to survey the premises, and report thereon. The surveyor's report stated the houses were in a dangerous condition, and, upon the receipt of a certificate to that effect, the Commissioners directed the usual notices to be served upon the defendants, prior to their applying to the magistrates under the Metropolitan Building Act of 1855.

The solicitor who appeared for Mr. Ernest admitted the service of the notices, and said he was willing to consent to an order to pull down the premises in six weeks from the present time.

Mr. Miller admitted the receipt of the usual notices with regard to No. 98, Cheapside, but said he could not enter into any such arrangement as that proposed by Mr. Ernest. He was the occupier of 98, and Mr. Harwood, the freeholder, had promised to let him

have a lease if he would pull down and rebuild the house, which he agreed to do, and had gone to considerable expense in preparing to carry out the condition, when Mr. Ernest stepped in, and, as he supposed, outbid him, for Mr. Harwood granted him (Mr. Ernest) a lease over his (Mr. Miller's) head. Under these circumstances he must leave the Commissioners of Sewers to take what course they thought proper.

Alderman Finnis said it would have been better if Mr. Ernest had been prepared to answer this case as well as the first, for one house could not be taken down without the other, and the expense must eventually fall upon him in both instances.

Mr. Tyrrell suggested that the order should be made the same in both cases.

The magistrates accordingly ordered that the condemned houses should be pulled down, and the hoarding removed within six weeks from the present date.

METROPOLITAN IMPROVEMENTS.

IT is rather singular, that while such a vast number of suggestions on the above subject has inundated the new Board of Works since its appointment, they have all had reference exclusively to the construction of additional thoroughfares between the *eastern* and *western* parts of the metropolis. But not a thought has been given to the wretched state of our communications between the *north* and *south*, which call loudly for a portion, at least, of the attention which the authorities have to bestow on metropolitan improvements.

The most urgent want of all, and at the same time the most easily remedied and at the smallest cost, is a good line of street from the broad part of the Strand to Holborn through Lincoln's-inn-fields. It is, in fact, already more than half made. Nothing more is required than the destruction of some worthless old houses in confined courts between the Strand and Carey-street, and the setting back of the few houses on one side of Great Turnstile, to complete the whole line as far as Holborn; and the site of this new street would be so valuable for offices and chambers, that the improved ground-rents would cover the interest of the outlay three times over! For more than thirty years this very opening has been projected by the inhabitants of the neighbourhood, and the public have constantly been led to believe that it was on the point of being carried out. Yet to this day that magnificent area of Lincoln's-inn-fields—the largest open space in the heart of London—is suffered to remain a perfect *cul de sac*, except for pedestrians! The only direct carriage-entrance is from Greet Queen-street, and that by a narrow shabby street. From the north there is no approach whatever, except by two courts for foot-passengers. From the east there is only the private gate into Lincoln's-inn-square, which can be shut at pleasure! From the west (besides the narrow approach from Queen-street, already alluded to) there is only an entrance under a dark archway from the purlieus of Clare-market! And from the south there is literally no possibility of reaching the square in a vehicle of any description, except by a tortuous passage through market-sheds and cabbage-carts, surpassing in difficulty the Cretan labyrinth. All this would be in a great measure cured by the new street proposed, but this ought undoubtedly to be followed up by an opening on the north side of Holborn, with a branch to the right leading into Bedford-row, and another to the left into Red Lion-street. The former, by the removal of a very few old buildings to connect Millman-street and New Millman-street, would complete a direct thoroughfare from the Strand to Guildford-street, and thence through Mecklenburgh-square to the upper end of Gray's-inn-lane, and the railway station at King's-cross.

The next thing I would urge is so perfectly simple and easy of accomplishment, that it is a positive reproach to the commissioners who have hitherto had the control of public improvements that it has not been carried into effect long ago. I mean the setting back of some four or five houses at the lower end of St. Martin's-lane to the line of the adjoining buildings. Large sums have been expended to widen the upper end of St. Martin's-lane and form a broad street, crossing Holborn into Bedford-square, and thence in a direct line to the New-road and Euston-square station; but this well-designed plan is entirely spoilt at present by leaving the street quite narrow at the very point where it ought to be broadest, namely, where it approaches the National Gallery and the fine portico of St. Martin's Church.

Another great improvement, and at the same time involving but a very moderate outlay, would be a short street from the top of Bedford-street to the corner of Long-acre and St. Martin's-lane, which would cut through a beggarly neighbourhood, and would amply repay its cost. This street would lead directly into Cranbourn-street, and would soon become the main thoroughfare from the Strand to Coventry-street and Piccadilly, instead of the narrow and intricate passage by Hemming's-row and Green-street.

There is one other plan, which I have suggested on a former occasion, and which I am sure would be an immense improvement, not only as regards public convenience but also architectural effect, namely, a broad and handsome street from Somerset House to the British Museum, falling into the line of Drury-lane just beyond the Olympic Theatre, with a branch eastward into the south-west corner of Lincoln's-inn-fields, and the same branch extended westward into Wellington-street, connecting it with Waterloo-bridge. As this scheme, however, is of somewhat greater magnitude than the others I have pointed out, and is not so immediately pressing, I shall reserve the details for a future communication, in case I should be encouraged to pursue the subject.

A MIDDLESEX MAGISTRATE.

THE SCHOOLMASTER IN NOTTINGHAM.

IN one of my peregrinations lately, I found myself in a street in the low part of the town of Nottingham, and my attention was attracted by a new building, apparently intended for scholastic purposes, which became more evident on a minute examination of certain hieroglyphical characters placed on the façade of the building, in encaustic tiles. After some spelling out, rendered a task by the redundance of flourishes, conceived, I suppose, to be "illumination," the following inscription was the result at which I arrived:—

"S. PVTVRS PEROCHIEL SCHOOLS."

Whether the attitude assumed by the unfortunate letters "A" in the second word, is to represent the modes of punishment intended to be inflicted on refractory children, I know not. If some "dame" were to place a card in her window, which stated "Bad spelling taught here," should we wonder at no infants being sent for the benefit of her instructions? Where is the difference between such an advertisement and the public announcement above alluded to? Simply that the one is gazed at and admired because the public cannot make it out, and the other is unfortunately written in too legible characters, and in English.

But seriously, is it not too bad to have such errors made, and those, too, after a party has been employed to see that all is properly executed? Either ignorance or carelessness is surely chargeable on those who superintended the buildings. In conclusion, I would beg most humbly to propose that, if a diploma is to be granted to architects, before they be allowed legally to practise, a printing lesson, in mediæval letters, at least once a week, be made to form a part of their studies.

AN ANTIQUARY.

RECENT BUILDING PATENTS.

THE following particulars as to patents recently filed, are quoted from the *Engineer*, *Mechanics' Magazine*, and other sources:—

Tabourin, G. A. "A new system of metallic arch, proper for the construction of bridges, arcades, vaults, roofs, and all other such purposes." Patent dated July 4, 1855. (No. 1501). The fractional arches of this system are generally made of cast-iron united together by jointed under-lugs, somewhat like the legs of a pair of compasses, or the parts of a folding foot-rule: a central joint bolt is passed through the under-lugs. Each beam or girder forming a complete arch, is composed of as many fractional arches as may be required to form the total length of the whole beam or arch, the length of each fractional beam or arch having been previously determined. The beams or girders are laid up in parallel lines at a suitable distance from each other, so as to form bridges, vaults, or arcades of the required breadth. They are then united by single bolts passing through the centre of the lugs, which are separated by tubular transoms traversed by the same bolts. One of the principles of the invention is the hinge-like joint of two adjoining arches, which, it is urged, allows of the comparatively easy conveyance of the bridges, and of their being erected or repaired quickly, and with great facility. The system of jointed arches may also, it is said, be employed in construction for the beams of roofs of great length, by merely modifying one of the ends of the first and of the last fractional arches, which should then have a propping face at the lower end, and also a resting face or footing, butting and resting on the top of the wall.

Pym, J. "A new combination of materials suitable for building purposes." Application dated July 7, 1855. (No. 1525.) The patentee adds to five hundred weight of bitumen about five hundred weight of carbonate of lime powder, about one pound of sal-ammoniac, and as much coarse sand or grit as will mix freely with the former materials, when heated in a cauldron. To this is added, as the article may be required to be more or less solid or tenacious, resin, shellac, glue, or pitch, the proportions of which may vary according to the purposes to which the article is to be applied. To add strength to the combination, when used in the manufacture of railway sleepers, or other articles of like character, cocoa-nut fibre, wood shavings, or other fibrous substances, are mixed with it when heated. The material is cast in moulds of the form and size required.

Newton, A. V. "A new manufacture of fire and burglar-proof glass." (A communication.) Patent dated July 9, 1855. (No. 1,535.) The inventor manufactures plates or pieces of glass with a metallic wire cloth or grating contained within the body or thickness thereof, and so incorporated therewith that if the glass be shattered or broken into pieces, the mass will continue to be bound together by the wire-cloth or grating, thus presenting the toughness of an iron grating, with the impassable and transparent qualities of glass.

Flynn, H. E. "Improvements in preventing fire from the over-heating of hot-air flues." Application dated July 9, 1855. (No. 1,531.) This invention consists in "constructing parts, particularly the moveable wheels or slides or valves used to open and close the flues, or all or any part or parts of any safety-valves applied to the 'hot-air flues' or 'caliducts' of amalgams," which fusing at lower temperatures than the brass or other metals, or compounds of metals used in the fixed parts of the said hot-air flues, will melt before the heated air reaches a dangerous temperature.

Adams, J. "Improvements for indicating the time when persons commence and leave their work or calling." Patent dated July 11, 1855. (No. 1,554). According to this invention a series of cells or chambers are caused to revolve regularly by clock-work. These revolving cells are enclosed in a box, in the top of which is an aperture, from which descends a tube. The cells or chambers are by the motion of the clockwork brought successively under the end of the tube, so that a card or ticket put in at the aperture in the top of the box descends by the tube into one or other of the revolving cells or chambers, and thus registers the time at which it was put into the box.

Provisional protection has been granted (2,931) to James Edgar Cook, of Greenock, Renfrew, booking-clerk, for "an improved composition for preserving exposed surfaces, or surfaces liable to deterioration and decay."

THE FALL OF THE STAIRS AT CHELMSFORD SHIRE-HALL.

AT the adjourned inquest, reported in the local *Chronicle*, Mr. Thomas Hopper, who has been the county surveyor since 1816, gave evidence, and was of opinion that the accident was caused by the dense pressure of a large mass of persons in motion against the outer rail: the pressure upon the rail acted as a lever upon the stairs. He had never reported to the magistrates that he thought the stairs insecure.

Mr. Seaton (a juryman).—We find the steps cut away 2 inches, and the stairs broke down at the very point where the facing to the steps had been done.

Witness.—It was done in a workmanlike and perfectly secure way: it did not weaken the stairs, as it was done in a scientific way—in a manner that was unexceptional. I give my opinion before God that what was done to these stairs tended rather to strengthen than to weaken them. Mr. Wray did it, and I was satisfied it was done in the most scientific and workmanlike manner.

Mr. James Fenton was examined. He said—I did not know the staircase before it fell, but I examined the ruins on Saturday morning, and I found the landing had separated from the stairs: the steps had been what we call rebated together in the original construction, but were not pinned. He attributed the accident to the landing being insufficient. The whole staircase was on an angle, and the whole of the weight depended on the outer corner of the landing. I have no doubt the landing gave way first, though a person looking on might not perceive it. I have put stairs up only 3 inches thick, and they are standing safe now.

A Juryman.—How was that part rendered weak?

Witness.—By piecing: one-fourth of the section of each step had been taken away. If you cut through the step originally there was an area of 66 inches: out of that there had been 16 inches taken away; but if the landing had not given way, I believe the steps would not have gone: each step in the original construction ought to have been pinned.

After some further evidence and an inspection, the jury returned the following verdict:—"Accidental death, occasioned by weakness in the original construction of the landing at the bottom of the third flight of stairs which fell."

Miscellanea.

SUPPLY OF WATER TO THE TOWN OF NEATH.—The premium of twenty-five guineas offered some time since by Mr. Wm. Bullock Webster for the best plan of supplying the town of Neath with water, has been awarded to Mr. Egbert Moxham, of this town. Seven plans were sent in, and Mr. R. W. Mylne was selected to examine them and award the premium. In his report, Mr. Mylne says,—"Generally speaking, great care has been evinced by some of the competitors in the preparation of their plans, and in the examination of the capabilities of the sources, and in the detailed arrangements; while others have confined their schemes more to the general distribution in the town, and have omitted altogether provisions for filtration and service reservoirs. After due consideration, I have selected two designs, as in my opinion the best adapted to the requirements, and superior in their engineering character. One is from Mr. Newton, of Swansea, the other from Mr. Moxham, of Neath." After explaining the merits and deficiencies of each scheme, Mr. Mylne, in conclusion, considers Mr. Moxham's design as the best of the two, but says there are several points on which improvements should be made before the scheme could be considered complete.

SCHOOL OF ART, TRURO.—The ladies of the morning class have presented to the master, Mr. G. R. Gill, a silver-mounted dressing-case, as a mark of their esteem for his manner of conducting their studies. The progress of the class it refers to affords much satisfaction, we are told, to the promoters of the school.

SUBTLETIES OF SCIENCE IN SAMPLES OF SAND.—A great impostor, of the name of Simonides, was lately unmasked by Professor Ehrenberg, of Berlin, the celebrated microscopic discoverer of the animalcular or shelly origin of chalk, who, on examining with his microscope a pretended ancient manuscript, "discovered" by Simonides, observed, that the "ancient" ink ran above, not beneath, other ink of professedly less ancient or more modern origin, also traced upon the parchment. The same acute professor has just succeeded in unkennelling a thief of gold coins, abstracted while on their way, in a barrel, by railway, to Berlin. When the specie was abstracted, the barrel was filled with common sand, and Professor Ehrenberg procured specimens of sand from the neighbourhood of every station on the line, and, on microscopically examining the samples, very soon identified the station whence the barrelled sand must have come: the hint was sufficient, and led to the identification of the thief amongst the few *employés* on duty at that particular place and time.

NEWCASTLE-UPON-TYNE SOCIETY OF ANTIQUARIES.—At a recent meeting of this society, a paper, by the Rev. D. H. Haigh, of Erdington, was read "On the inscribed Cross at Bewcastle, in Cumberland," which was declared to be the earliest that we have of Anglo-Saxon times. It is a four-sided column, about 14½ feet high, tapering gently from base to top. At same meeting Dr. Bruce submitted a sketch, by Mr. Dobson, of the proposed adaptation of railway arches and waste ground to the purposes of the museum, and also called attention to a notice of the forthcoming meeting in Edinburgh of the Archæological Institute.

GAS.—The directors of the Lincoln Gas Company are about to have constructed at their works machinery for testing the purity and illuminating power of the gas manufactured by them; and, when completed, a daily register will be kept of the condition of the gas, the accuracy of which, according to the local *Chronicle*, will be tested by one of the first scientific men of the day, to be brought specially to Lincoln for the purpose.——The Southampton company were about to raise the price of their gas from 5s. to 6s. per thousand cubic feet, but at the instance of a deputation of the local Chamber of Commerce, they have consented to take sixpence off the proposed advance in price, and have promised to "reduce still further" when "coals, &c." are reduced in price.——A gas company is about to be established at Gibraltar, under the auspices of the governor.——A prospectus has also been issued of a company for lighting Constantinople with gas. The capital is fixed at 100,000*l.* in 1*l.* shares. The directors, however, have not yet had any privilege conceded to them by the Sultan or his government; nevertheless, it promises well.

"BOLECTION WORK."—In Browne Willis's survey of the Cathedral Church of St. Asaph, 1720. page 5, I find this passage:—"From beyond the stalls up to the altar, and also round the altar, the wall is cover'd with wainscoat, well finished with Belection work, which is painted, as are also the halls, tho' but poorly." What is the meaning of *belection* work: I can find it in no dictionary?—A SUBSCRIBER.

*** Mouldings which project beyond the surface of a piece of framing are called bolection or balection mouldings.

THE VOLCANIC SHELL.—Although the vocation of your readers,—and it is a noble one,—is to raise up buildings for the comfort and convenience of their fellow-men,—to form princely palaces, with pinnacles standing out in proud relief against the sky,—and to rear cottages, which, in becoming the "homes of the thousands," are yet the grandest effort of their genius,—I trust they will read without impatience a few particulars of a projectile, before whose mighty force the erections of a century would be annihilated in an hour. The "volcanic shell," as many of your readers are probably aware, consists of a hollow sphere of iron furnished with an inner tube of the same metal (forming as it were, an axis to the globe), filled with the powder required to burst the whole, and fitted with an ordinary "fuse." The body of the shell contains a composition which I have designated the "annihilating fluid." Let us suppose this terrible missile to be sent on its errand of destruction against,—say a "man-of-war" of gigantic dimensions,—and as it whistles through the air, and true to the aim of a British gunner, strikes the middle of the quarter-deck,—a moment more, and a fiery shower sets sails, ropes, timbers, all in a blaze; and a few buckets of water are idly scattered about in the vain hope of putting it out. The rest may be imagined. Even if the sea is complaisant enough to extinguish the flames by half-drowning the ship, the crew must be provided with lungs of a very peculiar make if they can "stand" the poisonous vapour produced by the combustion of my "annihilating fluid." Such is the agent of destruction, upon which the "chemist to the Ordnance" has reported favourably, and with which the Board of Ordnance have granted an experiment, to take place at Woolwich, I hope, ere many weeks have passed. In order to test more fully the effect of water upon the *fluid*, the following expedient was devised and carried out, each drop of ignited *fluid* having to pass through from six to nine inches of cold water. I had heard of such a thing as a "storm in a tea-cup," and therefore concluded that there was no reason why a "volcanic shell" should not be exploded in a washing-tub! Accordingly, a good specimen of the above "domestic article" was half sunk in the ground, filled with water, and surrounded by a quantity of dry straw and shavings, and a model-shell, of glass, less than two inches in diameter, was then plunged six inches under the water in the tub. The "subaqueous fuse," communicating with the "bursting charge," was then fired: explosion took place, and a perfect fountain of "liquid fire" soon inflamed the straw, &c. in all places where the latter was not soaked by about 1½ gallon of water, also dislodged. I fancy these facts require no comment. In conclusion, I beg most emphatically to claim the *priority* and *superiority* of my invention to all others of a professedly similar nature; also that (like the manufacturers of "patent perambulators"), I have no "connection with any other party."—WENTWORTH LASCELLES SCOTT.

CAMBRIDGE ARCHITECTURAL SOCIETY.—The last meeting for the Lent Term was held on Wednesday, March 5th. The Rev. G. Williams, Vice-Provost of King's College, one of the vice-presidents, took the chair. A paper was read on the Eucharistic Vestments of the Church by the senior secretary, Mr. S. B. Gould, of Clare College. He described the alb, stole, maniple, dalmatic, tunicle, and chasuble, tracing their history and variations in form from the early period of the Church, and illustrating his remarks by copies of old illuminations and brasses, and by modern examples. A discussion followed, in which the Rev. G. Williams described the richness of the Greek and Russian saccos, and the Rev. W. M. Campion and the Rev. H. R. Bailey took part.

SETTLEMENT OF DISPUTES AS TO WAGES, &C.—A memorial has been laid before Sir George Grey, the Home Secretary, by a committee of the National Association of United Trades, for the protection of industry, praying that he would take into consideration the subject of appointing stipendiary magistrates (barristers of five years' standing) in all large towns in the manufacturing and mining districts, and cause all cases of dispute respecting wages, agreements, contracts, hours of labour, quality and quantity of work, and other matters and disputes between masters and workmen, to be brought before these magistrates for adjudication and settlement.

SALE OF NAVY TIMBER.—Messrs. Hobbs, of this city, on Friday last, sold some fine navy timber at Stifford's-bridge, to the extent of nearly 1,000*l.* There was a large attendance on the occasion. The oak was particularly fine, as a proof of which it may be stated that some years ago an offer of 100*l.* was made for one of the trees now sold. The choicest lots of oak sold at about 3s. per foot; best elm (of which there were some extraordinarily fine specimens), at 1s. 6d.; fir, about 1s. Higher prices would have been obtained but for the distance of the timber from market, and the consequent expense of haulage.—*Worcester Herald.*

THE LEEDS NEW TOWN-HALL.—At a meeting of the Leeds town-council, on Wednesday before last, the subject of erecting a tower on the new Town-hall was discussed, and Alderman Hepper asked for a vote of 4,000*l.* for the purpose. Ultimately, upon the resolution going to a division, the numbers in favour of the tower were found to be twenty-seven, and those in opposition only eight. The motion was accordingly carried. No other design for the tower, besides that already illustrated in the *Builder*, has as yet been prepared, but it is said that a new design will be submitted to the council by the architect.

MARYLEBONE FREE LIBRARY.—We are glad to observe from the annual report just issued that the experience of the past year enables the committee to state that the advantages of the Marylebone Free Library continue to be sought with undiminished interest. The institution now consists of two branches, a library of reference, and a lending library. The number of visitors at the rooms of the institution since its opening, has been 59,531. Of these, somewhat less than half have attended during the past year. The reference department has received during the past year, from various sources, an accession of upwards of 1,000 volumes, rendering nearly 5,000 books now available in this department of the Library. From a list giving the avocations of persons frequenting the rooms during the year 1855, it is satisfactory to observe that among the working men who attended there were of carpenters, plumbers, painters, decorators, and others engaged in building trades, no less than 5,693; and of smiths, brass workers, &c. 1,092.

BRISTOL AND CLIFTON GRAPHIC SOCIETY.—This society gave its first *conversazione* for the present season at the Victoria-rooms, Clifton, on Tuesday evening in last week, when, as on former occasions, a numerous and fashionable company assembled. The exhibition occupied the committee-room, the corridors, and the small ball-room, while a part of the large ball-room was enclosed as a tent and appropriated for refreshments: all the rooms were decorated with foliage and groups of flowering plants in bloom. The octagon walls were covered with sketches by Mr. Eagles, whilst the centre contained a fountain, of large size, contributed by the Coalbrookdale Iron Company.

GENEVA: SUBALPINE RAILWAYS.—The Lyon-bourg section of the line connecting Geneva and Lyon being near its completion, the easterly portion has been begun, which presents many interesting features. From Seyssel to Bellegarde the line runs along the Rhone, on high earthbanks, through cuttings of mountains, &c. At Bellegarde the valley is arched over by a viaduct of eleven arches, which is a remarkable work. Equally so is the Credo-tunnel, which, when completed, will have a length of 3,912 mètres, being 7 m. high and 8·50 broad. The fusion between this Swiss line-company and the Mediterranean has been lately effected.

ALLEGED DEFECT IN RESERVOIR AT MALVERN.—The alleged unsafe condition of the Wyche reservoir has become a matter of much anxiety to the local commissioners, and a committee was appointed to examine the structure. A report from Mr. Simpson, the engineer, was read at a meeting of the board, in which he pointed out certain alterations necessary to its security, but the commissioners resolved to take the opinion of Mr. Elmslie upon the subject. A communication from Mr. Elmslie was lately given to the effect that Mr. Simpson's proposed plan would weaken the lower part of the tank by throwing the weight of water upon it. Mr. Harper said the report merely told them that they had a reservoir which might be filled, but from which they must take no water or the sides would fall in. He had prepared a plan which he would guarantee would do. It was agreed to adjourn the subject for a week, and in the meantime the committee would take Mr. Harper's proposals into consideration.

SUICIDE OF A BRICKMAKER.—Mr. William Rhodes, the well-known brickmaker, has committed suicide, after suffering severely from mental depression. An inquest has terminated in the usual verdict of temporary insanity.

ELECTION OF SURVEYOR, HASTINGS.—On the 7th inst. at Hastings, there were no less than sixty-two candidates for the office of surveyor as lately advertised in this paper. Mr. John Laing, late surveyor, of Great Yarmouth, was unanimously elected.

SCENERY AT THE HAYMARKET THEATRE.—For a very elegant comedy in three acts, by Mr. Bayle Bernard, recently produced at the Haymarket, under the title of "The Evil Genius," three very good scenes have been painted,—one, a room in a villa; another, the gardens before the villa; and a third, the park of a country mansion—the last by Mr. W. Callcott, whose very charming scenery for the introduction of the pantomime deserves even more praise than we have already given it. The comedy is exceedingly well acted, especially by Mr. Buckstone, Miss Reynolds, and Mr. Compton.

SCULPTURE COMPETITIONS.—We understand that the committee of the Baines Testimonial, at Leeds, invited six sculptors to submit, in competition, models for the design, and that three of the sculptors, viz. Mr. P. M'Dowell, R.A.; Mr. Calder Marshall, R.A.; and Mr. J. H. Foley, A.R.A. declined the invitation, informing the committee that the very unsatisfactory manner in which such trials of artistic skill were conducted, precluded their availing themselves of the opportunity offered for the exercise of their art.—— From Liverpool invitations have been sent to twelve eminent sculptors to send in models for a statue of Archdeacon Brooks, to be placed in St. George's Hall. The sum offered for the work is 1,750*l.*

BELLS AT ROTHERHAM.—The company of ringers ask us to say that on Monday, the 3rd inst. was rung for the first time a new peal of six bells, recently hung in the tower of Rawmarsh Church, near Rotherham, Yorkshire, and that they do credit to the founder, Mr. Mears. They were hung by Mr. Hurry.

PORPHYRY SARCOPHAGUS.—A letter from Stockholm says:—"The sarcophagus in porphyry which King Oscar ordered twelve years ago from the mines of Elfdahe, for the mortal remains of his father, Charles XIV. (John Bernadotte) has just been completed, and in a short time will arrive in this city. This magnificent work, not more remarkable for the beauty of the porphyry than for the execution of the *bassi relievi* which ornament it, weighs 75 shippunds (16,000 kilogrammes). The cost of its conveyance to Stockholm will amount to 30,000 f.

WORCESTER SOCIETY OF ARTS.—The members and friends of this society held their annual *soirée* at their rooms in Foregate-street, Worcester, on Thursday evening in last week. Mr. de Poix Durieux read a paper in course of the evening "On the Principles of Art as applied to Drawing, Painting, and incidentally to Architecture."

SLATER AND TALL'S WOOD-WORKING MACHINERY.—Mr. Thomas Slater, optician, who is known for his inventions in connection with the mechanical arrangements of the electric light, and Mr. Joseph Tall, tool-maker, have recently combined their endeavours for the improvement of wood-workers' tools. The particular subject which they have taken in hand is the manufacture of joiners' and carpenters' planes, by the aid of set machinery, in such way that peculiar accuracy in the work is, it is said, secured, in conjunction with great rapidity of production. Messrs. Slater and Tall's invention comprehends, firstly, an arrangement of machinery for cutting the parallel sides of the blocks out of which the planes are to be formed; secondly, machinery for mortising the angular cavity into which the plane-iron is fitted; and thirdly, an improved form of plane-iron. The *Practical Mechanics' Journal*, in describing these inventions in detail, says,—"The whole of these details, and especially the mortising or slotting apparatus, are most ingeniously contrived; and they bear evidence of the bestowal of more than usual care in the perfection of every part."

NEW RIVER COMPANY.—The following is the official statement of the receipts and expenditure of this company during the past year:—Receipts—Water-rents from houses, trades, watering the streets, and water sold in bulk, 150,143*l.* 14s. 8d.; groundrents and rents from land, &c. 9,123*l.* 1s. 8d.; miscellaneous receipts, 5,532*l.* 13s. 9d.; appropriation from money borrowed on bonds for new works, extensions, &c. 291,845*l.* 17s. 11d.; total, 457,445*l.* 8s. Expenditure—Ordinary expenses of repairing and maintaining the works and collection of revenue, 70,407*l.* 15s. 4d.; interest on money borrowed, 20,991*l.* 14s.; dividends to proprietors, being equal to about 4½ per cent. on the capital, as settled by the Act of 1852, 60,912*l.*; amount carried to contingency fund by way of reserve, 13,288*l.* 9s.; purchase of lands, &c. for new works, improvements on river, pipes, pipe-laying, and other outlay, 291,845*l.* 17s. 11d.; total expenditure, 457,445*l.* 8s. The capital of the company is stated to amount to, inclusive of the additions up to the end of 1855, 2,086,842*l.* 6s. 3d.

SCULPTURE AND BUILDERS.—Permit me to draw attention to a great question connected with the progress of sculpture. Is it likely that the present school of carving will improve, as long as builders remain the disposers of it? If the two sister arts, architecture and sculpture, have to assist one another, how can that be done, when a builder stands betwixt them? Under the present system, the architect gives his orders to the builder, by whom the sculptor is employed and rarely or never comes in contact with the architect.—A SCULPTOR.

TENDERS

For the proposed Greyhound Inn, Brook-street, Holborn. Mr. E. l'Anson, architect:—

Howard	£3,295	0	0
Holland	2,749	0	0
Thompson	2,630	0	0
Mackenzie	2,600	0	0
Young	2,564	0	0
Ryder (accepted)	2,478	0	0

TO CORRESPONDENTS.

"*Cleaning Boards.*"—"J. K. E." asks for a receipt for "cleaning and whitening boards," as nothing has such an unsightly appearance as dirty and bad coloured boards.

"M. O'R." (from what is said as to crushing and grinding in the specification of the patent for black paint, the carbon used would appear to be simply the fine dust of charcoal—not lamp nor ivory black. It is of course the process rather than the kind of carbon that is patented.)—"M. O'K."—"D. M." (can we see any rough view?)—"S. W."—"J. B."—"W. T." (we can get no precise information.)—"J. F."—"A. and Sons."—"Rev. C. D. M."—"Delta." (such a wash is to be purchased).—"Foreign Engineer" (unless precautions be observed, iron houses are open to the objections named).—"J. F."—"W. H. T." (no sufficient *external* view has been given).—"P. and D. C."—"S. B."—"Suum Cuique."—E. H."—"W. T." (the French newspapers).—"F. L." (the designs at Lille are, we believe, open to the public)—"H. A. H."—"T. G."—"J. G. S."—"H. H."—"J. G. W."—"Y. Z." (our informant was engaged upon it, and is no doubt correct).

"*Books and Addresses.*"—We are forced to decline pointing out books or finding addresses.

NOTICE.

FROM and after the 1st January, 1856, the *entire postage* upon all newspapers sent to France, and Foreign countries *vid* France, must be prepaid: the stamped copy of the paper is of no avail.

ADVERTISEMENTS.

BUILDING LAND.—Some most eligibly situated LAND, TO BE LET on Building Leases, of ninety-nine years, in that healthy and increasing locality, West Ham, Essex, four miles from London. Railways and omnibuses running near to the place several times a day. The ground-rents very low; and respectable builders might be assisted with loans—Inquire of Mr. WATSON, No. 14, Upton row, West Ham, Essex.

FREEHOLD LAND TO BE LET, on Building Lease for ninety-nine years. Money advanced to responsible parties. Freehold Land to be Sold for building purposes in eligible situations.—Apply at the Offices of Messrs. MORGAN and PHIPSON, Architects, 5, Chancery-lane.

BUILDING LAND, in the rear of, and with an entrance from, REGENT-STREET and HANOVER-SQUARE.—Messrs. SMITH and CHAPMAN are instructed to LET or SELL, a capital PLOT of GROUND, suitable for the erection of a banking-house, insurance office, or public rooms.—Plans may be seen, and cards to view, obtained at their Auction and Land Agency Offices, 238, Regent-street.

FREEHOLD LAND for SALE.—Valuable Plot for Twenty-four Six-room Houses, forming nearly the whole of one side of Grafton-street, Kentish-town. The sewer is built and will be included. This land will readily let at 5*l.* 10s. per house; more might be obtained by small lettings. Low-set price, 2 500*l.*—For further particulars apply personally to Messrs. CHARLTON and WALKER, 18, Southampton street, Fitzroy-square.

CAMDEN-TOWN CEMETERY BUILDING ESTATE.—TO BE LET, on Building Leases, for Ninety-nine Years, very eligible SITES upon the above estate having good frontages into Camden-street and Bayham-street, and including frontages to an intended street, to be called St. Martin's-place, and mews approached from Pratt-street. There is a great demand for private houses of the third rate in this locality, which is enhanced by its near proximity to the North-Western and North London Railway Stations, and the Hampstead-road.—Plans may be seen and particulars obtained by application to H. E. KENDALL, Esq. Architect, 17, Suffolk-street, Pall-mall East; or to JOHN DANGERFIELD, Esq. Solicitor, 36, Craven-street, Charing-cross.

TO BUILDERS.

LEE, near BLACKHEATH.—FRONTAGES TO BE LET, for detached or semi-detached villas, on the Belmont Estate. This estate contains the finest sites for building purposes anywhere round London, and good villas are in great demand, on account of the situation being lofty, dry, well drained, and exceedingly healthy. Assistance will be afforded to responsible parties.—For particulars, apply to Messrs. J. and G. W. TODD, Milner-street, Brompton, London, or Belmont, Lee, Kent; or Messrs. NELSON and INNES, 6, Whitehall; and of Messrs. KIRKMAN and ENGLEHEART, King William street, City.

FREEHOLD GROUND.—WANTED to PURCHASE, about ONE ACRE of FREEHOLD GROUND, in the neighbourhood of Lower Holloway-road.—Send full particulars to Mr. JOHN LAW, Victoria Tavern, Holloway.

BUILDING AGREEMENT TO BE SOLD. To BUILDERS, BUILDING SOCIETIES, and OTHERS. HAVERSTOCK-HILL, HAMPSTEAD-ROAD.—TO BE SOLD, a valuable Building Agreement for a PLOT of FREEHOLD LAND, situate in one of the healthiest and most commanding positions in London, and only three minutes' walk from the Railway Station, Chalk Farm, whereon is to be built Fifty-six Houses. There is sufficient brick-earth dug and prepared for making at once bricks sufficient for erecting the whole of the houses. The Plant necessary for carrying on the works could be had with the brick-earth at a fair valuation, or the holder of the land would make the bricks at a low price to be agreed upon.—For particulars apply to Mr. NUTTER, Land Surveyor and Auctioneer, Prince of Wales-road, Haverstock-hill.

MAITLAND-PARK, HAVERSTOCK-HILL, HAMPSTEAD-ROAD, Land-tax redeemed.—TO BE LET, upon building leases, for 99 years, desirable BUILDING SITES upon the above estate. The continued demand for houses in this locality, and the picturesque position of the property, adjoining the grounds of the Orphan Working School, render this a desirable opportunity for builders or gentlemen wishing to erect villas for themselves.—For plans and terms apply to the Secretary of the Orphan Working School, 32, Ludgate-hill; Messrs. TERRELL and CHAMBERLAIN, 30, Basinghall-street; the Architects, Messrs. WEHNERT and ASHDOWN, 42, Charing-cross; or at the Lodge attached to the School.

POOLE HARBOUR, POTTERY CLAY DISTRICT, DORSETSHIRE.—TO BE LET, and entered upon immediately, CLAY LAND. A good site for erecting and establishing a Pottery Manufactory, being immediately contiguous to the Poole Junction of the Southampton and Dorchester Railway.—For particulars apply to Mr. PYNE, Canford Manor, Wimborne, Dorset.

HATFIELD, HERTS.—TO BE LET, very eligible BUILDING LAND, at Hatfield, seventeen miles from town, on the Great Northern Railway, suitable for the erection of villa residences.—For particulars, apply to Messrs. GEO. NICHOLSON and SON, Solicitors, 4, Old Palace-yard, Westminster.

FREEHOLD LAND, SHEPHERD'S-BUSH.—TO BE LET, or SOLD, by Private Contract, about THIRTY-SIX ACRES of valuable FREEHOLD BUILDING LAND, land-tax redeemed; most desirably situate, three miles from Hyde-park.—Plans and terms of Mr. PETER BROAD, 28, Poultry.

FREEHOLD GROUND, Fetter-lane.—The Commissioners of Sewers of the City of London hereby give Notice, that they will meet in the GUILDHALL of the said City, on TUESDAY, the 22th of APRIL next, at TWELVE o'clock at noon precisely, to receive PROPOSALS for taking on BUILDING LEASE for eighty years, certain PLOTS of GROUND, situate at the south-east end of Fetter-lane. Further particulars may be had, and a plan seen, on application to Mr. HAYWOOD, Engineer to the Commissioners, at these Offices in the Guildhall. The Commissioners will require a plan and elevation of the Premises proposed to be built to be submitted to them for approval; and do not bind themselves to accept any proposal unless deemed advantageous. JOSEPH DAW.
Sewers Office, Guildhall, March 4th, 1856.

TO BUILDERS and OTHERS. — An excellent SITE TO BE LET or SOLD, for BUILDING PURPOSES, with a good double frontage, situate in a leading thoroughfare, and in an established neighbourhood, well adapted for shops and dwelling-houses, and workshops. The materials of the present erections may be used if sound, in erecting any new buildings that may be approved. Money will be advanced if required by the purchaser, or taken to carry out the undertaking, upon a satisfactory arrangement.—Inquire of Messrs. HOWARD and DOLLMAN, Solicitors, 141, Fenchurch-street; Mr. EDWARD LOWTHER, 58, Red Lion-street, Clerkenwell; or of Mr. MURRELL, Auctioneer, 1, Walbrook, City.

STRATFORD, ESSEX.—FREEHOLD LAND within three miles of London, exonerated from land tax, and free of tithe, TO BE LET on lease for a long term of years, in large or small plots, suitable for manufactories or building purposes.—Apply to Mr. W. H. DEAN, Auctioneer and Surveyor, Stratford; or to Mr. GEORGE POWNALL, Surveyor, 37, Bloomsbury-square, London.

HARROW.—FREEHOLD LAND.—TO BE SOLD, 100 ACRES, in a ring fence, and several other eligible plots of FREEHOLD LAND, at a moderate price, contiguous to the Harrow Railway Station, surrounded and intersected by capital roads. Residents are entitled to the privileges of the Harrow School, and the London and North Western Railway Company offer to persons building houses of approved elevation, worth 50*l.* per year each, a free first-class pass between Harrow station and Euston-square, for eleven years. There is an abundant supply of excellent water, and very superior brick-earth on the land.—Apply to WILLIAM B. COOPER, Esq. Solicitor, 3, Verulam-buildings, Gray's-inn.

FREEHOLD GROUND for Building on.—TO BE LET, upon BUILDING LEASES, PLOTS of GROUND, in that healthy locality, Holloway, two or three minutes' walk from the Archway Tavern. Omnibuses every four or five minutes to all parts of London. Situate in St. John's-road, where houses let as fast as built.—For particulars, apply to Mr. H. WITHERS, 9, Poultry; or Mr. WILLS, 2, Esplanade, Ealing. The leases direct from the freeholder. Money advanced.

FOUNDLING HOSPITAL.—The Committee of Governors will meet at the Hospital on SATURDAY, the 15th instant, at TEN o'clock, to receive PROPOSALS for a LEASE of PREMISES in Sugar-loaf-court, Garlick-hill, Upper Thames-street.—Plans of the property may be seen, and further particulars obtained, at Mr. HENRY CURREY'S Office No. 4, Lancaster-place, Strand.—By order of the Committee,
March, 1856. J. BROWNLOW, Secretary.

MONEY on LOAN, at 3*l.* per Cent. per Annum.—ARNEWAY'S CHARITY.—NOTICE IS HEREBY GIVEN, that the Trustees of this Charity are enabled to lend out the Trust Moneys to poor occupiers or traders resident within the City and Liberty of Westminster, that is to say, within the parishes of St. Margaret and St. John the Evangelist, St. Anne, Soho, St. Clement Danes, St. George, Hanover-square, St. James, St. Martin-in-the-Fields, St. Mary-le-Strand, and St. Paul, Covent-garden. The amount of each loan is not to exceed 100*l.* is to clear interest after the rate of 3*l.* per cent. per annum, and is to be secured by the bond of the borrower, with two sureties. Printed Forms of Application, and all necessary information, may be obtained by applying personally, between the hours of Ten and Three o'clock in the day, at the office of the Clerk and Solicitor to the Trustees, No. 14, Great Queen-street, St. James's Park.
By order, EDWARD S. STEPHENSON,
Clerk and Solicitor to the Trustees.
NOTE.—The Trustees meet on the second Wednesday in every month, to consider such applications for loans as have been sent in one clear week at the least before the first day of the month.—The sureties must be unexceptionable.

MONEY on MORTGAGE of UNFINISHED and other PROPERTY, Reversions, Life Interests, &c. ready to be advanced in large or small sums, at a moderate interest. Periods of repayment at the option of the borrower, and law charges included.—Apply (if personally, from Nine to Eleven a.m.) to Mr. J. R. GOVER, Eagle Cottage, New Kent-road, London.

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PATENT SOLID SWISS PARQUETERIE. This beautiful, unique, economical, and elegant description of Flooring, so extensively used in Paris and other continental cities, is now introduced into this country: an extensive assortment of specimens and patterns commencing at 1s. per foot super. together with every particular of its cost and adaptation, can be obtained of Mr. BURT, 2, Charlotte-row, Mansion House; or of Messrs. ARROWSMITH and CO. 80, New Bond-street.

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ROYAL POLYTECHNIC.—Patron, H.R.H. Prince Albert.—During Passion Week, viz. on the 17th, 18th, 19th, and 20th, Lectures on Astronomy, by J. H. Pepper, Esq. with a magnificent Dissolving Orrery and Diagrams, each morning at 2 30. In the evenings only at 8, Astronomy, with Haydn's sublime Creation, by a Band and Chorus of Fifty Performers, under Mr. Waud, of the Royal Italian Opera. For names of the eminent vocalists, &c. see programmes.—N.B. The Free List will be entirely suspended. Admission, 1s. Children and Schools half-price.

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A GLASS-CUTTER and WAREHOUSE FOREMAN in the above business wishes for a RE-ENGAGEMENT; is thoroughly competent, understands bookkeeping, and can have good reference. — Address, A. B. 57, St. John-street, Smithfield.

TO ARCHITECTS.

AN ARCHITECTURAL COLOURIST, of considerable experience, ENGAGES to COLOUR COMPETITION and OTHER DRAWINGS on reasonable terms. Perspective and other drawings put in outline. Lithographs, &c. &c. Drawings coloured, and transmitted to the country.—Address, B. C. Mrs. Plumer's Library, Theobald's-road, Bedford-row.

AS FOREMAN of UPHOLSTERERS.—REQUIRED, a competent person in the above capacity by a west-end firm.—Apply, by letter, addressed to Y. Office of "The Builder."

A YOUTH, of good education, aged 16, wishes to obtain a SITUATION in the Office of a Surveyor and Architect, where he would have opportunity for improvement, with a small salary. He is a good draughtsman and understands plans and surveying.—Apply to G. N. Scadding's Library, Belgrave-road, Pimlico.

TO MACHINISTS, MANUFACTURERS, AND OTHERS.

AN experienced, ingenious, and well-educated Machinist, and every other way suitable, OFFERS his SERVICES as FOREMAN, CLERK of WORKS, or TRAVELLER; is thoroughly acquainted with forge work, plate-iron work, gas-fitting, mechanical drawings, bookkeeping, &c. The highest references given.—Address, M. B. 6, Albert-terrace, Camden-road.

TO BUILDERS.

A WALKING FOREMAN, well experienced and fully qualified, is OPEN to an ENGAGEMENT.—Address, B, Hope Coffee-house, Bell-alley, Moorgate-street.

TO BUILDERS, CABINET and PIANOFORTE MAKERS.—The finest figured log of St. Domingo MAHOGANY to be seen at Messrs. TUELY and CO.'S, Mahogany Merchants, Bridge-wharf, Citr-road.

GREAT REDUCTION of PRICES.—SAMUEL PUTNEY respectfully solicits the attention of buyers to the great reduction in the price of Yellow Deals, and the very low prices of Pine and other Deals, &c. &c.:—

Yellow Deals, from	£21 0	per 120
Do. Battens	12 10	"
Spruce Deals, from	18 0	"
Pine Plank, 12 ft. 3 in. by 11, from	22 10	"
Mahogany in Planks and Boards	6d.	per foot super.

Prepared Flooring, &c. equally low. A list of prices forwarded on receipt of a postage stamp.—Borough-road, Southwark, and Elm-street, Gray's-inn-lane.

SEASONED FLOORING.—GEO. NOKES and CO. (late Archbutt and Atkinson), beg to acquaint builders and the trade, that they have a large STOCK of DRY WHITE and YELLOW FLOORING, prepared by machinery, always on sale, at the following reduced prices, for cash:—

½ inch White,	13s. 6d. per square.	½ inch Yellow,	13s. per square.
1 ditto	15s. "	1 ditto	16s. 6d. "
1 ditto	18s. "	1 ditto	20s. "

Laths, 36s. per load.

Also Timber, Deals, Planks, &c. Mouldings by machinery in very great variety.

ST. PANCRAS SAW-MILLS, Cambridge-street, Old St. Pancras-road.

GEORGE SMITH, TIMBER-MERCHANT, LONDON.—Address to No. 18, Binfield-road, Clapham-road, Stockwell; or Jamaica Coffee-house, City. Goods delivered from the Docks. PREPARED FLOORING, &c. from the Sawmills. Goods in Bond for Exportation.

N.B. A large Stock of Dry Prepared Flooring, &c. from Two to Four Years Old.

EDWARD SIMMS begs to inform Builders and the trade, that he has now on hand at his manufactory (the first of its kind ever established), a large assortment of PREPARED FLOORS and MATCH BOARDING, seasoned, and ready for use, from ¼-inch to 1¼-inches thick, in White or Yellow Deal, Oak, or Pitch Pine. Also Dry Deals, in all thicknesses, Slating Battens, Pantile Laths, Oak Cills, Plank, and Scantlings. Mouldings in clean Pine, to any design. A pattern list forwarded on application.—Address, E. SIMMS, Flooring Manufactory, Wilton-road, Pimlico; and Sawing, Planing, and Moulding Mills, King's-road, Chelsea.

TO BUILDERS AND OTHERS.

AT the LOWEST PRICES.—TIMBER, DEALS, MAHOGANY, and WAINSCOT. A large assortment of seasoned prepared FLOORING and MATCH-BOARDING of all descriptions. Also an extensive stock of Dry White Yellow, and Pine Cut Stuff, Slating, Battens, Pantile Laths Oak Plank, Sash Cills, &c. Timber of all kinds, Planks, Deals and Battens, fetched from the docks, sawn by patent machinery in the best manner, and delivered at the shortest notice.—THOMAS JACKSON, Sawing and Planing Mills, Commercial-road, Pimlico, London.

OAK SASH-CILLS, QUARTERING, &c. ready cut out to sizes and lengths required, at the lowest price.

Address, E. SIMMS,

SAWING, PLANING, AND MOULDING MILLS, KING'S-ROAD, CHELSEA, AND WILTON-ROAD, PIMLICO.

COUNTER TOPS.—R. VIGERS, TIMBER MERCHANT, Kennington, Surrey, solicits the attention of builders and shop-fitters to his carefully selected MAHOGANY, suitable for Counter Tops, and to his seasoned Materials for builders, cabinet and blind makers, &c. Delivered, cartage free, to any of the London railway stations, or within three miles from Kennington Church.

ALFRED ROSLING begs to inform his Customers and the Building Trade generally, that he is enabled to allow a discount of 15 per cent. upon his list prices for Mouldings.—A large stock of dry flooring at low prices.—Southwark-bridge Wharf, Bankside.

TO BUILDERS, CARPENTERS, &c.

SAMUEL CROWHURST, Jun. begs to call the attention of Builders, Cabinetmakers, &c. to his Stock of seasoned and well-assorted Timber Goods, Deals, and Mahogany in Logs, Planks, Boards, &c. at prices which will be found equal if not less than any advertised. Country Builders supplied on the most liberal terms.—Timber-yard, Hanover-street, Walworth; and Francis-street, Newington, near the Church.

MACHINE CARVING WORKS (Patent). Ecclesiastical and every other description of CARVING. A magnificent Gothic Screen, Carved Glass Frame, and other specimens. Tables, Chairs, Lecterns, &c. Designs and estimates at the Works, Belvedere-road, Lambeth, foot of Hungerford-bridge.

ACORN TIMBER WHARF and SAW MILLS, CANAL BRIDGE, OLD KENT-ROAD, LONDON. A Monthly Price Current forwarded on application. RICHARD MAY, Proprietor.

A SUBSTITUTE FOR PAINT, AND AT HALF THE COST.

STEPHENS' DYES or STAINS for WOOD. The following extract from a letter the Proprietor has obtained leave to make public:—"Northgate, Colchester, Feb. 5, 1855.—Sir,—I have just finished a new church with your Oak Stain, and I consider it the best adapted for the purpose, being the nearest approach to the real wood of any I have ever used.—I am sir, your obedient servant,

"SAMUEL GRIMES, Builder.

"To Mr. Henry Stephens, 54, Stamford-street, London."

Samples and prospectuses free to any part of the kingdom.

TO BUILDERS, COACH-MAKERS, DECORATORS, HOUSE-PAINTERS, &c. &c.

CHAS. W. NOBLE (late A. and F. Strong), VARNISH MANUFACTURER, continues to supply every description of Varnishes and Colours, of the very best quality, and at the lowest prices. The Varnishes manufactured by Noble have stood the test of nearly a century, made of pure materials, insuring that desideratum in varnish—body, polish, and finish,—for which his predecessors have been so long and so far famed.

*** Methylated Spirit Varnishes, Polishes, &c.; also Noble's Enamel Paper Varnish, for decorators, &c. Coach-painters' and Lithographic Colours.

N.B.—Merchants and shippers will find an advantage in exporting Noble's Varnishes.

Manufactory—MITCHAM, Surrey.

Wholesale and Retail Warehouse—117, LONG ACRE, London.

TO TIMBER MERCHANTS and OTHERS. The Proprietors of Lett's Wharf, Commercial-road, Lambeth, offer the most convenient Wharf for landing all sorts of English Timber, &c. Spacious Dry and Drawing Docks, 30 and 10-ton Cranes, Sawpits for converting Timber, &c. Freights paid on delivery.—Apply to G. NOKES and Co. as above.

LETT'S WHARF PATENT SAWING, PLANING, and VENEER-CUTTING MILLS, Commercial-road, Lambeth.—The proprietors beg to announce to the trade that they have completed their extensive arrangements, and will be happy to execute all orders intrusted to their care with despatch and punctuality.

N.B. All goods sawn at these mills fetched and delivered free of charge.

FRENCH POLISH and SPIRIT VARNISHES made from Methylated Spirit, 62 over proof.

Best French Polish	6s. 6d. per gallon.
Spirit Varnish	6s. 6d. „
White French Polish	10s 0d. „
Methylated Finish	6s. 6d. „

By JAMES SLIPPER, 97, Leather-lane, and 14 and 15, Dorrington-street, Holborn, London.

CRYSTAL PALACE.—PICTURE GALLERY.—It is intended to construct in the north wing of the Crystal Palace (at present occupied by the raw produce) a GALLERY for the EXHIBITION and SALE of modern PICTURES of all the schools of Europe. The gallery will open early in the ensuing summer. No charge will be made for exhibition; but it is proposed to charge 5 per cent. on sales. Communications to be addressed to Mr. HENRY MOGFORD, F.S.A. at the Palace, in whose hands the Directors have placed the management of the gallery, and from whom full particulars may be learned. The Directors reserve to themselves a right of selection.—By order.
G. GROVE, Secretary.

THE PHOTOGRAPHIC SOCIETY'S THIRD ANNUAL EXHIBITION is NOW OPEN, at the Gallery of the Society of Painters in Water Colours, 5, Pall-mall East. Open at TEN. Admission, 1s. Evening, from SEVEN to TEN. Admission, 6d. The Exhibition will be closed on the 29th instant.

TO ARCHITECTS AND OTHERS.

MR. EDWARD L. PARAIRE is desirous of Meeting Gentlemen who require COLOURED ARCHITECTURAL DRAWINGS. External, Internal, Isometrical Perspectives got up; outlines of same neatly coloured, with background, on terms that will insure approval. Temporary assistance given in getting up Plans, Elevations, Sections, Detail, and Working Drawings.—Mr. E. L. P. makes a consideration in his charge where competition drawings prove unsuccessful.
Address, 8, Rathbone-place.

TO ARCHITECTS.

EXHIBITION and COMPETITION DRAWINGS, coloured or tinted, and superior LITHOGRAPHY, in its various branches, executed by Mr. T. J. RAWLINS (Author of Elementary Drawing Classes, adopted at Marlborough House; Outlines of Sculpture; Modern Architecture, &c.), 38, University-street, University College, London.

DRAWING, &c.—One Guinea per Quarter. Comprising Architectural, Engineering, Mechanical, Perspective, and Water Colour Drawing; Taking out Quantities; Measuring Builders' Work, &c. &c. Gentlemen who cannot attend at the Establishment, can be attended at their residence on moderate terms, in any part of town or country, by Mr. SMITH or Mr. LEWIS.—Offices, 24, Guildford-street.

DRAWING CLASSES.—24, Guildford-St. Russell-square.—At this Establishment Pupils are thoroughly Instructed in Architectural, Civil Engineering, and Mechanical Drawing; Ornamental, Perspective, and Water-Colour Drawing; Taking out Quantities, Measuring, Estimating, &c. &c.
Terms, One Guinea per Quarter. Prospectuses and full particulars may be had at the Offices.

ARCHITECTURE, CIVIL ENGINEERING, and SURVEYING CLASSES. Established by Messrs. HYDE, SMITH, and LEWIS, Architects, Civil Engineers, Surveyors, &c. For Preparing Gentlemen for Architects, Builders, Engineers, Surveyors, Draughtsmen, Measurers, &c. and for giving EVENING INSTRUCTION in Architectural, Civil Engineering, and Mechanical Drawing; Colouring, Shading and Tinting; Ornamental and Water-Colour Drawing; Perspective, Isometrical, and Geometrical Drawing, Making Finished and Working Drawings; Preparing Specifications, Taking out Quantities, Estimating, Measuring and Valuing Builders' Work, &c. &c. Terms:—Day Pupils, Three Guineas per Quarter; Evening Pupils, One Guinea per Quarter. There are no extras, the terms include the whole of the above, with the use of Drawing Boards, T Squares, Plans, Drawings, Models, &c. Prospectuses and full particulars may be had at the Offices, 24, Guildford-street, Russell-square.

MATHEMATICAL DRAWING INSTRUMENTS.—JOHN ARCHBUTT, 20, Westminster-Bridge-road, Lambeth (near Astley's Theatre), begs to call attention to his Stock of Instruments manufactured by superior workmen. The prices will be found considerably lower than ever charged for articles of similar quality and workmanship. Rules, scales, tapes, &c. at equally low prices. An illustrated price-list will be immediately forwarded, free, on application.
N.B. A few New and Second-hand Levels and Theodolites always for Sale.

ATRIMEN'S CHURCH and CHAPEL ARCHITECTURE, with more than 1,000 Gothic Mouldings, selected from the best examples this country contains. 5s. and 10s. 6d.
London: LONGMANS and CO.

TO ARTISTS, ENGINEERS, DRAUGHTSMEN, AND OTHERS.

PENCILS.—If you want a really good Pencil, at a moderate price, apply to J. H. WOODLEY, 30, Fore-street, City, London. Best Drawing Pencils (free from grit), 2s. per dozen; specimen set of five, 1s. or, post free, fourteen stamps. Best Carpenters' Pencils, 1s. per dozen. Woodley's complete Drawing-Book, 2s. 6d. Economic Sketching-Books, to copy in, 6d., 1s., 1s. 6d. and 2s. each.—N.B. The Trade and Schools supplied.

TO SURVEYORS and Others engaged under Sir Benjamin Hall's Metropolitan Act, and by Local Boards of Health.—JOHN ARCHBUTT, of 20, Westminster Bridge-road, Lambeth, near Astley's Theatre, begs respectfully to call the attention of the above to his stock of new and second-hand THEODOLITES, DUMPY and Y LEVELS, by Rubergall, Jones, Harris, and other eminent makers, varying in prices from six to nineteen guineas. He has also a selection of Box Sextants, Prismatic Compasses, and Telescopes, by Troughton and Sims, Jones, and Schmalcalder; and a variety of Level Staves, Tapes, and Land Chains. N.B.—Communications from the country promptly attended to.

CHAPPUIS'S NEW PATENTS.—GAS and DAYLIGHT REFLECTORS. See Description in Mr. Edmeston's Report at the Architectural Exhibition, in "The Builder," 23rd February, 1856.
Manufactory and Warehouses, 69, Fleet-street.

PORCELAIN LETTERS for SHOP SIGNS. Porcelain and China Lock Furniture and Finger-Plates, in great variety. Porcelain Scale-Plates. Stoneware Mortars and Pestles, of the best quality. Metal covered, Parian stone and earthenware Jugs, Bath Tiles, &c. &c. can be had at Messrs. THOMAS, JOHN, and JOS. MAYER'S, China and Porcelain Warehouse, No. 2, Pancras-lane, Queen-street, London, where an extensive stock is always on hand of every style of pattern and quality.
Shipping orders executed with care and promptness.

TO ARCHITECTS, Schools of Design, Institutes, and Others.—Statues and Busts.—An excellent collection of CASTS from Classic and Gothic Architecture, TO BE DISPOSED OF on advantageous terms—Apply, by letter, to Mr. W. D. CLARKE, 13, Chepstow-place, Camberwell New-road.

GRAVEL.—Wanted, about 100 loads of PRIME STRONG GRAVEL, for a road.—Particulars to be sent to Mr. WELCHMAN, 23, Rutland-gate, Hyde-park.

SPECIAL NOTICE.

KENT MUTUAL ASSURANCE SOCIETIES.
CHIEF OFFICES:
QUEEN-STREET-PLACE, NEW CANNON-STREET, LONDON.
The united annual incomes exceed 27,000l.; and all Profits belong to the Assured.

LIFE.
The next division of Profits will include parties assuring before the 24th March next.
The new business of the last eight months exceeds 5,000l. in Annual Premiums.

FIRE.
The Guarantee Fund is being increased to Half-a-Million.
The annual income, since last annual meeting, has increased beyond 5,000l.
GEORGE CUMMING, Manager.
N.B.—Agents are still wanted for some vacant localities.

SIXTH DIVISION OF PROFITS.

CLERICAL, MEDICAL, and GENERAL LIFE ASSURANCE SOCIETY, 99, Great Russell-street, Bloomsbury, London.

SPECIAL NOTICE.
All persons who assure on the Participating Scale before June 30th, 1856, will be entitled to a Share of the SIXTH BONUS, which will be declared in the January following.
Proposals should be forwarded to the office before June 1st next. The Thirty-first Annual Report (just issued) can be obtained of the Society's Agents, or of
GEO. H. PINCKARD, Resident Secretary.

SIXTH BONUS.

UNION ASSURANCE SOCIETY.— (FIRE—LIFE—ANNUITIES).
Instituted in the reign of Queen Anne, A.D. 1714.
Cornhill, and 70, Baker-street, London.
Chairman—J. Remington Mills, esq
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James Bentley, esq.	John Paynter, esq.
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S. Preston Child, esq.	Richd. Horsman Solly, esq.
William Gilpin, esq.	W. Foster White, esq.
Thomas Mills, esq. M.P.	Samuel Wilson, esq. Ald.
John Morley, esq.	Stephen Wilson, esq.

The LIFE BONUS of the year 1855, of four-fifths of the profits of the LIFE DEPARTMENT, has been just declared, and (with the exception of a reserve of nearly 20,000l. to accumulate towards the next Bonus of 1863), is payable upon and with the sum insured, being at the rate of 10l. 10s. per cent. for the last seven years, on Policies effected in Great Britain upon the Profit System.

THIS BONUS MAY BE APPLIED EITHER
By having the annual premium reduced for the next seven years, which will in many cases extinguish the same for that period;
Or by adding the amount to the sum insured;
Or the value thereof may be received immediately in money.
The Directors beg to state that, by a recent change in the regulations of this Society, the assured realize the advantages of MUTUAL OFFICES by sharing the entire profits (less one-fifth as a small compensation for the necessary guarantee), and are free from the liability incurred by the members of such Societies.
The accumulated invested capital now amounts to upwards of ONE MILLION sterling.
THOMAS LEWIS, WM. B. LEWIS, } Joint Secretaries.

LONDON and WESTMINSTER BANK.
Paid-up Capital, 1,000,000l.
DIRECTORS:
The Right Hon. the LORD MAYOR.

Henry Bosanquet, esq.	Thomas Farncomb, esq. Aldn.
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Temple-Bar Branch, 217, Strand, Charles Ward, Manager.
Current accounts are received on the same principles as those observed by the London bankers. No Christmas-boxes or other gratuities are allowed to be taken by the officers of the bank. The bank also takes the agency of Joint-Stock Banks, private bankers, and other parties residing at a distance. Cheques on penny stamps may be drawn from any place in the United Kingdom. Strong rooms are provided for the security of deeds and other property lodged by the customers of the bank.
Sums from 10l. to 1,000l. are received on deposit at the rate of interest to be fixed at the time, and they are repayable upon demand, without notice. If withdrawn within a month, no interest is allowed.
Sums of 1,000l. and upwards are also received on deposit receipts, upon such terms as may be agreed upon, with regard to the rate of interest at the time of repayment. Parties may lodge money upon an interest account who have no current account, and those who have current accounts may transfer any portion of their balance to an interest account.
The rate of interest allowed at present on deposits of 500l. and upwards is 5 per cent.
J. W. GILBART, General Manager.
London, January 16, 1856.
The dividend for the past half-year at the rate of 6 per cent. per annum, and a bonus of 5 per cent. on the paid-up capital of the bank (free of income-tax), will be payable on Monday next, the 21st instant.

HOSE PIPING.—WAITHMAN'S PATENT FLAX HOSE PIPING will sustain a greater pressure, is lighter, less bulky, will wear longer, and is about 60 per cent. cheaper than the leather hose pipe. Manufactured only by WAITHMAN & CO. Bentham, Lancaster.

No. 1 quality, inches diameter, and price per yard.

½	¾	1	1¼	1½	1¾	2	2½	2¾	3 in.
9d.	11d.	1s.1d.	1s.3d.	1s.5d.	1s.7d.	1s.9d.	2s.	2s.3d.	2s.6d. 2s.9d.

Super-extra stout quality.

2	2½	2¾	3 inches.
2s.	2s.3d.	2s.6d.	2s.9d. 3s. per yard.

No. 0. A cheaper hose, to bear a low pressure for gardens and agricultural purposes, at greatly reduced prices.

½	¾	1	1¼	1½	2	2½ inches.
9d.	10d.	11d.	1s.	1s.3d.	1s.6d.	per yard.

The hose is Burnettized at an extra charge of 3d. per yard. Union Joints, Branch Pipes, and Jets, are also supplied.

HANCOCK'S PATENT VULCANIZED INDIA-RUBBER TUBING, HOSE-PIPES, WASHERS, ENGINE-PACKING, both round and flat, and SOCKET-RINGS, for Hot-water-pipes. Vulcanized Rubber Door-springs, and Solid Round Rubber Cord of all sizes of any length. Billiard Cushions and Rubber Strips cut to any pattern for bagatelle tables.
Diving-dresses of superior make, and improved Vulcanized Rubber Supply-pipes for ditto.
Vulcanized Rubber, in sheets, from three to four feet wide, and of any thickness. Air-beds, Pillows, and Cushions inflating Portable Baths, Invalid Cushions, and Articles of this kind made to any pattern to order.
N.B. All communications and orders punctually attended to, addressed to the Manufactory, JAMES LYNE HANCOCK, Goswell-mews, Goswell-road, London.

MESSRS. HOOPER and FRY, INDIA-RUBBER MILLS, MITCHAM, being licensed by Messrs. Macintosh and Co. are prepared to give Estimates for VULCANIZED, CURED, and other INDIA-RUBBER GOODS, including Rail Buffers, Carriage and Engine Springs, Steam and other Packing, Brewers' and other Hose, Gas and other Tubing, Saw, Flour, and Machine Bands, Valves for Pumps and Stationary Engines, Washers, and all Articles of India-rubber. They also invite attention to the very superior and peculiar quality of their Waterproof Garments, Camp Blankets, &c. being free from smell, and permanently flexible in every climate, resisting alike heat at 300 deg. Fahrenheit, or cold at zero, and may be washed in boiling water without injury.—HOOPER and FRY, India-rubber Manufacturers, Mitcham; and 16, Walbrook, London.

DURABILITY of GUTTA PERCHA TUBING.—Many inquiries having been made as to the Durability of Gutta Percha Tubing, the Gutta Percha Company have pleasure in giving publicity to the following letter:—FROM SIR RAYMOND JARVIS, Bart., VENTNOR, ISLE of WIGHT.—Second Testimonial.—"March 10th, 1852.—In reply to your letter, received this morning, respecting the Gutta Percha Tubing for Pump Service, I can state, with much satisfaction, it answers perfectly. Many Builders, and other persons, have lately examined it, and there is not the least apparent difference since the first laying down, now several years, and I am informed that it is to be adopted generally in the houses that are being erected here."
N.B. From this Testimonial it will be seen that the CORROSIVE WATER of the ISLE of WIGHT has no effect on Gutta Percha Tubing.
THE GUTTA PERCHA COMPANY, PATENTEES, 18, WHARF-ROAD, CITY-ROAD, LONDON.

TO ENGINEERS, MILL-OWNERS, &c.
N. Woolwich Elastic Steam-packing (Canvas and India-rubber), at 1s. 4½d. per lb.

S. W. SILVER and CO. INDIA-RUBBER WORKS, North Woolwich (opposite H. M.'s Dockyards), having considerably extended their manufacture in order to meet the daily increasing demand upon them for this effective and durable article, are enabled to offer the very best material at the reduced price of 1s. 4½d. per lb. for sheet and rope.
Testimonials may be seen at S. W. SILVER and CO.'s Warehouses, Nos. 3 and 4, Bishopsgate-street (opposite London Tavern), where orders for Steam Packing, also Buffer Springs, Pump Clacks, and the various India-rubber appliances, will meet with prompt attention.
CAUTION.—S. W. S. and Co. have found it necessary to stamp all their manufacture, thus—"S. W. SILVER and CO. WORKS, NORTH WOOLWICH."

CHAS. MACINTOSH and CO. Patentees of the VULCANIZED INDIA-RUBBER, and GENERAL MANUFACTURERS of WATERPROOF, AIRPROOF, and ELASTIC RUBBER GOODS beg to inform all persons who desire to correspond with them direct, that their SOLE ESTABLISHMENTS are No. 3, Cannon-street West, London, and Cambridge-street, Manchester. This notice is necessary, as the term Macintosh Depôt, Macintosh Warehouse, &c. is frequently adopted both in London and the country by vendors of India-rubber goods, who deal in articles not of the manufacture of CHAS. MACINTOSH and CO. — Goods manufactured by CHAS. MACINTOSH and CO. are stamped with the name of the firm.

TERRA-COTTA WORKS, Blackfriars-road, London.—The PRIZE MEDAL for MATERIAL and WORKMANSHIP in TERRA-COTTA to M. H. BLANCHARD, late of Coade's Original Works, and successor to them in the manufacture of this invaluable material, that has been so successfully adopted for nearly a century in this country, by our eminent architects and others, in the adornment of our noblest buildings, and is the only tried material that is capable to stand the ravages of time unimpaired. Groups, Statues, Vases, Fountains, and Architectural Embellishments, at prices and quality that will defy competition. A large Stock of newly-designed Chimney Shafts and Pots, to suit the various styles of buildings, at very low prices, and worthy of notice.

BLASHFIELD'S PATENT TERRA-COTTA, Manufactured at Mill-wall, Isle of Dogs.—Capitals Consoles, Tracery for Parapets, Balusters, String Courses, Friezes, Bas-relievi, Vases, Statues, Chimney-shafts, and all other Architectural Ornaments modelled, finished, and burnt, in the best manner, and warranted to stand heat and frost, either in Buff or Red-coloured Terra-cotta.—A great variety and large stock may be seen at BLASHFIELD'S Warehouse and Show-rooms, No. 1, Praed-street, Paddington.

THE VIEILLE MONTAGNE ZINC MINING COMPANY'S PURE PATENT WHITE ZINC PAINT is unequalled for permanency of colour, hardness, and brilliancy of surface; it is unaffected by sulphureous or any other vapours or emanations. Being completely innoxious and free from the pernicious effects of white lead, it may be employed in all apartments whilst in use without any inconvenience to the inmates.
The greatest caution is recommended to avoid any spurious compounds that might be sold at cheap rates as Pure Oxide of Zinc. If any adulteration has taken place in the oxide, either in consequence of impurity in the material primarily made use of to produce it, an imperfect mode of production, or by mixing with the oxide certain substances calculated to give it increased weight, it then produces a very inferior instead of a very superior paint, and the economy realised by the purchasers of such oxides becomes a very expensive result to the owner of the premises painted with them.
The VIEILLE MONTAGNE'S ZINC OXIDES, dry or ground in oil, are sold with the VM mark—in Hull by Messrs. BLUNDELL, SPENCE, and CO.; when ground and dry, by Messrs. T. B. MORLEY and CO. and by the Company's Grinding Agents in London, Messrs. CHARLES DEVAUX and CO. Wholesale Agents, 62, King William-street, City; and by the Manufacturing and Painting Agent, Mr. FREDK. BRABY, Fitzroy Works, New-road. In Manchester and Liverpool, by R. CLAY, 8, Mersey-street, who is the acknowledged Painter to the Company for Zinc Paints, and undertakes painting ships, warehouses, dwelling-houses, &c. In Leith, by Messrs. R. ANDERSON and CO. Timber-bush; and in Southampton, by Mr. H. J. BUCHAN. Dry OXIDES and PAINTS, in kegs of 14, 21 and 28 lbs. and upwards, to be had of the Company's Agents in Birmingham, Newcastle, Glasgow, Bristol, Plymouth, Portsmouth, Norwich, Ipswich, Poole, and the Isles of Jersey, Guernsey, Man, and Wight; also in Dublin, Cork, and Belfast.
The Company also employ an acknowledged Painter in London, who will undertake any description of painting with Zinc Paint by contract.
For further particulars, apply to the Company's General Agency in London, 12, Manchester-buildings, Westminster.

WINDOW-BLINDS.—J. FULLER, Manufacturer, 29, Charlotte-street, Blackfriars-road. Established, 1850.—Venetian Blinds, from 10s. each, or 8d. per foot; Wire ditto, 7s. each, or 1s. 9d. per foot; Holland ditto, from 5s. each, or 5d. per foot. Every other description of Blinds equally low, warranted of the best manufacture. Discount to Builders and the Trade. Fixed complete.

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